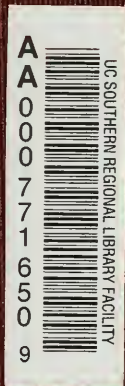


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PITTSBURGH
MAIN THOROUGHFARES
AND THE DOWN TOWN
DISTRICT 1910



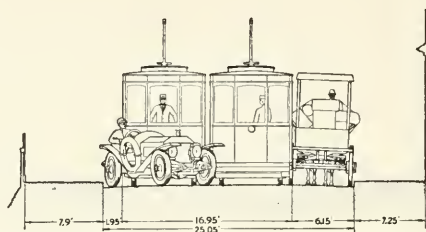
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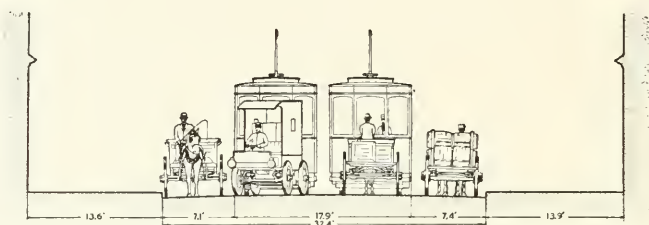


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PITTSBURGH
MAIN THOROUGHFARES AND THE
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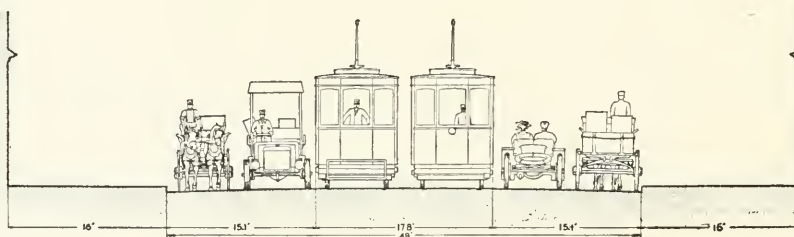


East Ohio Street—a two-line thoroughfare



Fifth Avenue—a four-line thoroughfare

Of the 530 miles of main thoroughfares within a radius of seven miles of City Hall, less than one and one-half per cent have room for passage between cars and vehicles, slow-moving or standing at curb. See page 31.



Liberty Avenue—a six-line thoroughfare

PITTSBURGH CIVIC COMMISSION

PITTSBURGH
MAIN THOROUGHFARES AND THE
DOWN TOWN DISTRICT

IMPROVEMENTS NECESSARY TO
MEET THE CITY'S PRESENT AND
FUTURE NEEDS

A Report

BY

FREDERICK LAW OLMSTED

Prepared under the direction of The Committee on City Planning

ADOPTED BY THE COMMISSION
DECEMBER, 1910

324 FOURTH AVENUE

FEBRUARY, 1911

Publication No. 8

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Dedication

THIS BOOK AND ITS CONTENTS ARE DEDICATED TO THOSE CITIZENS OF PITTSBURGH WHO, IMBUED WITH CIVIC PRIDE AND THE VISION OF A CITY USEFUL, CONVENIENT, ECONOMICAL AND HEALTHFUL, AS WELL AS BEAUTIFUL, WILL, IN THE YEARS TO COME, RESPOND TO THE CALL OF THEIR CITY TO SERVE IT WITHOUT HOPE OF PERSONAL REWARD, AND WITH PATIENCE, FIDELITY AND ENTHUSIASM.

PITTSBURGH CIVIC COMMISSION

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Letter of Transmissal

MR. T. E. BILLQUIST, Chairman,
Committee on City Planning.
Pittsburgh Civic Commission.

November 26, 1910.

Dear Sir:—I have the honor to submit herewith a report upon desirable improvements in the main thoroughfares and the down town district of Pittsburgh, prepared in accordance with the instructions of your Committee and in consultation with its members.

In submitting the report I wish to take the opportunity of expressing my appreciation of the attitude of your Committee throughout the twelve months during which the investigations and the preparation of the report have continued, and of the part which the keen interest of its members and their helpful criticism have had in making the report a useful one.

The closeness of the connection between the problems discussed in this report and those of the Traction System, which have been concurrently studied by Mr. Bion J. Arnold, has involved frequent conferences with Mr. Arnold and his assistant, Mr. George A. Damon, as well as with Mr. John P. Fox, engaged by the Mayor for a study of the same problem; and the information and suggestions furnished by them have been of great assistance. In the preparation of the report on the Allegheny River bridge problems, submitted jointly by Colonel T. W. Symons and myself and printed in Part V of this report, information furnished by Colonel H. C. Newcomer, in charge of the local office of U. S. Government engineers, has been of the utmost value. I am also greatly indebted to the Flood Commission, and especially to Mr. E. K. Morse, Chairman of the Engineers' Committee of that Commission, for the use of maps and other data gathered by them.

It would have been impossible to secure an intelligent basis for the conclusions and suggestions presented in this report without the great quantity of detailed information and other help furnished by the Board of Assessors, the Departments of Pub-

lic Safety, of Public Works and of Law, especially through Mr. N. S. Sprague, Superintendent of the Bureau of Construction, Mr. Chas. A. Finley, Superintendent of the Bureau of City Property, and Mr. Lee C. Beatty, First Assistant City Solicitor. Throughout the investigation and the preparation of this report I have had the benefit of illuminating and stimulating conferences with Mayor Magee.

The actual gathering of necessary information from the above and other sources, the field studies and the preparation of nearly all of the drawings accompanying the report, were carried on under the direction of my personal assistant, Mr. Edward C. Whiting, with the active help of Mr. Allen T. Burns and Mr. Sherrard Ewing, General Secretary and Assistant Secretary of the Commission, to all of whom my hearty thanks are due.

My friend and colleague in the study of several city problems elsewhere, Mr. Arnold W. Brunner, of New York, has given me valued counsel in regard to the possible architectural treatment of the proposed Civic Center, and has been good enough to contribute to the report the interesting sketches on pages 13 and 14 for a possible municipal building framing the east side of the proposed square.

As explained at length in the body of the report, the work has been greatly handicapped and limited in its scope and effectiveness by the entire lack of accurate detailed maps of the city and surrounding country. This lack would have rendered the report almost wholly impossible had it not been for the very useful topographical map of this part of Pennsylvania prepared and published by the United States Geological Survey. Not only have my studies of the outlying thoroughfares been based almost wholly upon this map, but the Survey has courteously permitted the use of transfer sheets from their original plates for the thoroughfare map published in this report.

Respectfully submitted,

(Signed) FREDERICK LAW OLMSTED.

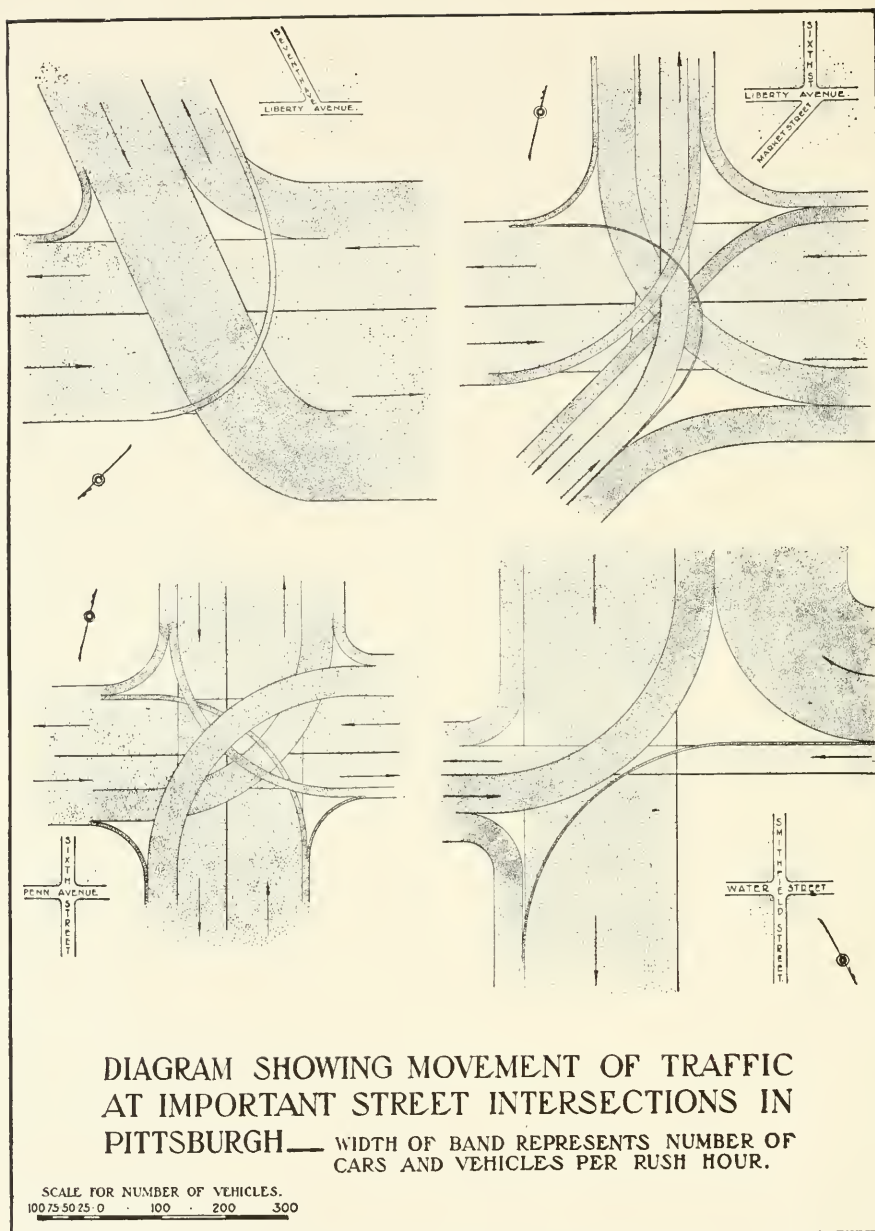
City Planning and the Cost of Living in Pittsburgh

PURPOSE AND PREPARATION OF THE REPORT

A FACTOR in the cost of living in Pittsburgh is stated graphically in the frontispiece of this report. These drawings also suggest, from Pittsburgh's own provision for some of her needs, a method to decrease this cost. All delays and congestion of traffic, such as illustrated on Fifth Avenue and East Ohio Street in the frontispiece and as shown by illustrations in this preface and the introduction, add to the expenses of manufacturers, the costs borne by wholesale merchants, and the prices charged consumers by retail dealers; in short inadequate traffic facilities in Pittsburgh, as in other cities, add to the cost of doing business and of living.

The map at the end of this preface portrays a second factor influencing the cost of living. This map shows how much land Pittsburgh has, both used and still unused, for business, manufacturing and residence districts and for means of communication, i. e., streets between these districts. A glance also indicates the almost unparalleled problems of this city because of the large amount of territory 25 per cent or over in grade. For land of this grade is not only unused for buildings and streets, but also often erects barriers to the natural growth and spread of business, manufacturing and residence sections. Consequently, Pittsburgh must exercise greater ingenuity and foresight than other cities to prevent such congestion of all these activities as would increase rents of all kinds abnormally. This would mean again an added burden to the ultimate consumer for all life's necessities.

In addition, tax rates are chronically assailed as a charge on the cost of living. But taxes are spent largely for improvements to furnish adequate streets, to provide for the city's spread and growth and to carry out other improvements which alone can make life livable and desirable in a modern city. In fact, "taxes may actually diminish the cost of living, if the city's money is spent economically in the performance of necessary co-operative



Note: Vehicle traffic on Market Street, between Fifth and Liberty Avenues, now discontinued

service." But taxes are often wasted because the improvements are made piecemeal, by patchwork, with no reference to future needs. Taxes for such improvements should be made only as a part of a far-sighted and comprehensive plan. Then, without waste, work done at the present will fit into the work to be done in the future.

By offering solutions for the above and many other similar problems this report demonstrates that practical city planning—or better, replanning—is part of the world-wide conservation movement. City planning is municipal conservation. Pittsburgh, like other cities and to a greater extent than most of them, faces the problem of using her financial and territorial resources to the utmost. The "utmost" means making these resources go the furthest in securing ample streets for transportation and traffic, and easy communication between all parts of the city; in providing for the cheap distribution of food, fuel and clothing; in making all residence districts as nearly as possible equally healthful, uncongested, and provided with trees and yards; in establishing for all residents public accommodations for recreation and leisure; and in maintaining and developing adequate districts for retail and wholesale trade, manufacture and commerce.

The Pittsburgh Civic Commission has conducted its city planning with the above ends in view, and purposes by this report to contribute to the economy, convenience, practicability and attractiveness of Pittsburgh's development and growth. The Commission began this work by retaining Bion J. Arnold, John R. Freeman and Frederick Law Olmsted to make a report on the outline and procedure of city planning for Pittsburgh. This report stated the scope and methods for investigations on the following subjects:

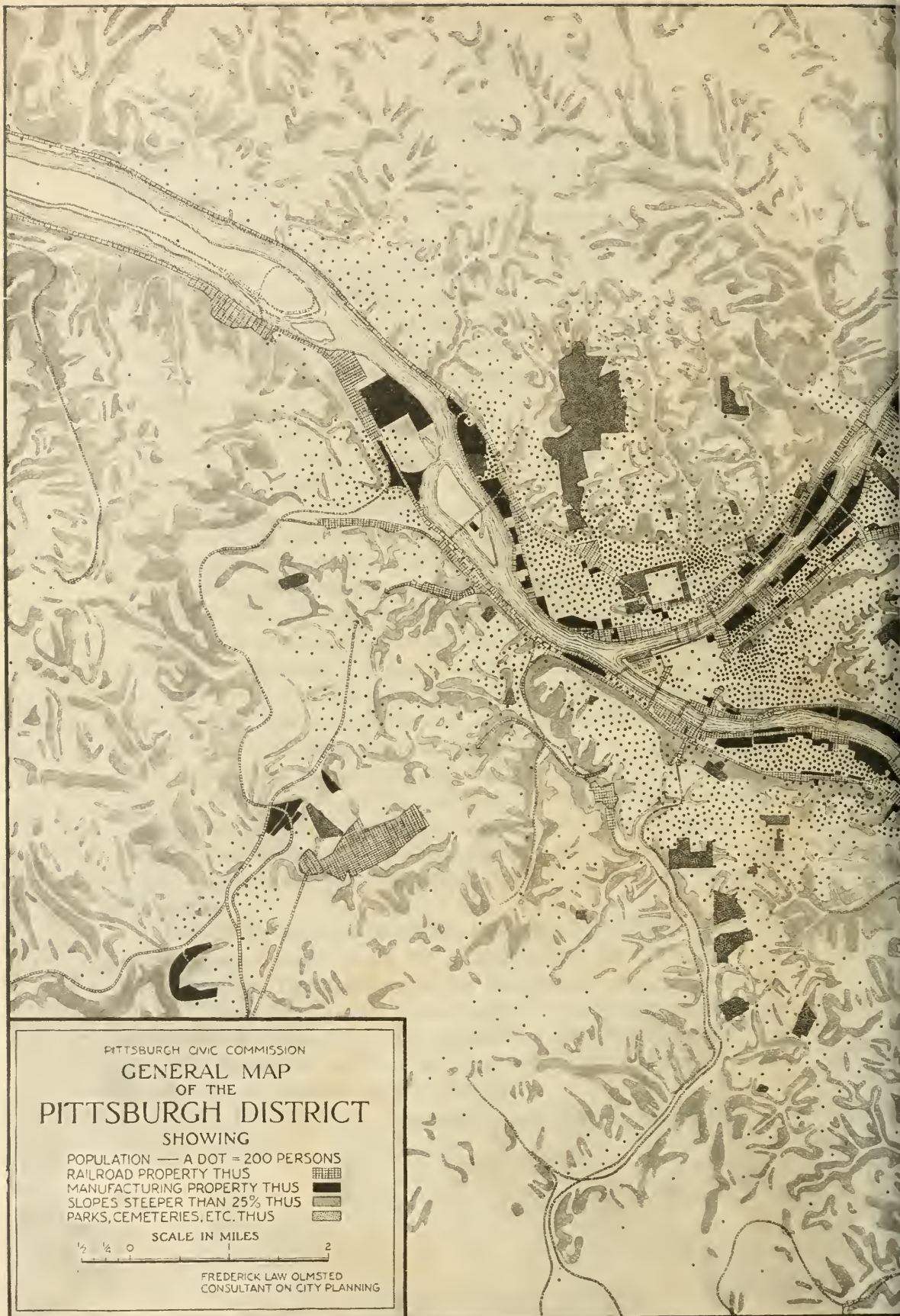
- Steam Railroads
- Water Transportation
- Electric Railroads
- Street Systems
- Public Lands and Buildings
- Water System
- Sewerage System
- Control over Developments on Private Property
- Smoke Abatement
- Building Code

Provision has been made by which several sections of this program are already under way. The city administration has been foremost in appreciating the necessity for just such investigations as the report recommended. Expert advice at this period in our civic advance is imperative if this city is to take its proper rank among American cities. Upon completion of the preliminary report Mayor Magee undertook to have studies made upon the electric and steam railroads, and requested that the Commission release to the city Mr. Bion J. Arnold for this purpose. This the Commission gladly did, and since then Mr. Arnold has conducted these investigations for the city along the lines laid down in this preliminary report. The preparation of a building code as suggested in this report was authorized by the city councils at the request of the Mayor, and the latter appointed a competent building code commission, and an appropriation has been made for the carrying out of this part of the City Plan. Mayor Magee also secured the retention of Mr. Allen Hazen of New York, who is making such a comprehensive study of an adequate sewerage system as was suggested in this report. Likewise, the Mayor has planned to carry out the studies for the water system.





The Commission itself continued the retention of Mr. Frederick Law Olmsted to make a study of a comprehensive main thoroughfare system for the center of the city and to the principal residence and manufacturing districts and the surrounding boroughs. Mr. Olmsted was also asked to report upon the locations of the main public buildings and grounds of the down town district. This report was to cover both immediately necessary improvements and a comprehensive improvement program for the next twenty-five years. Thus could present improvements be made economically because planned with reference to those of the future.


The Commission presents herewith Mr. Olmsted's report on these subjects, made under the supervision of the Committee on City Planning. The members of this Committee have given months of time from their private business to the consideration of every detail of this report; and this committee, with Mr. Olmsted, has given to the report its value as a contribution to the movement for the Greater and Better Pittsburgh.

PITTSBURGH CIVIC COMMISSION.



PITTSBURGH CIVIC COMMISSION
GENERAL MAP
OF THE
PITTSBURGH DISTRICT
SHOWING

POPULATION — A DOT = 200 PERSONS
RAILROAD PROPERTY THUS 
MANUFACTURING PROPERTY THUS 
SLOPES STEEPER THAN 25% THUS 
PARKS, CEMETERIES, ETC. THUS 

SCALE IN MILES


FREDERICK LAW OLNSTED
CONSULTANT ON CITY PLANNING



PITTSBURGH

MAIN THOROUGHFARES AND THE DOWN TOWN DISTRICT

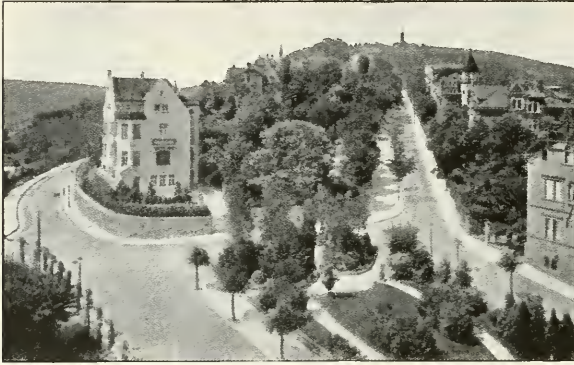
Introduction

THERE are two main divisions of City Planning. One looks to the rearrangement and improvement of what has already been unwisely done through lack of proper planning or through force of adverse circumstances of any sort. The other looks to the wise and economical layout of what still remains to be done, especially at the outskirts of the city where the major part of the city's growth is bound to occur, and where the city plan is daily taking shape out of nothing, whether it is intelligently designed or not.

Prevention is cheaper than cure, and a moderate expenditure of effort and money will accomplish far greater results in the long run if applied to the wise control of the growing suburban districts, where new streets are constantly coming into existence, than if applied to costly remodeling of the older parts of the city; but the latter is sometimes of the utmost importance, and is of direct interest to a much larger number of citizens than the prosaic work of controlling scattered suburban development. In accordance with the instructions of the Commission this report deals primarily with certain problems of remodeling in the down town district, and with the improvement of the main thoroughfares between this, the heart of the city, and the more important outlying districts.

To carry out at once all the recommendations of this report would, even if it were possible, impose an altogether unreasonable financial burden upon the City and the contiguous boroughs. Such procedure is unnecessary and indeed impossible. But in

many cases there is a crying need for the improvement already, or it is of such a nature that any delay is apt to involve a considerable increase in the cost and the difficulty of carrying it out.



Suggestive treatment of street junctions in outlying districts, Stuttgart

The most urgent general improvement of this sort is the establishment of new building lines on all main thoroughfares which it is proposed to widen; this in order to anticipate, as far as possible, the construction of new

and costly buildings on the present street lines.

Of the specific recommendations made in this report it seems advisable to give the earliest attention to the following:

In the Down Town District

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The extension of Grant Boulevard to Webster Avenue	11
The acquisition of land required for the proposed Civic Center	11
The widening of Diamond Street	17
The widening of Market Street	17
The relocation of the Market	18
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The elimination of the Try Street grade crossing	10
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*Baum Street improvement	20	65
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*Hamilton Avenue extension and connection with Kelly Street	22	65

*Already provided for, wholly or in part, in the current bond issue.

PITTSBURGH—INTRODUCTION

3

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In the following cases the actual improvements are not so urgent, but the new street locations should be established before expensive developments, which are apt to occur at any time, shall interpose serious new difficulties in the way of the proposed improvements:

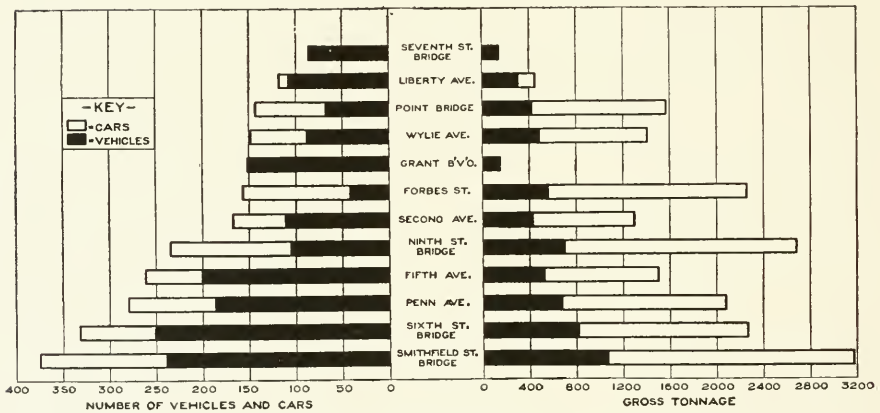
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For other specific thoroughfare improvements recommended in this report there appear to be no very urgent demands at present. Generally speaking they should be carried out only as some special opportunity offers, or in anticipation of some obstructing development which cannot now be foreseen, or as a growing traffic shall demand.

But a thing of greater consequence than any one of these specific improvements, a thing of vital import to every taxpaying citizen of the present and future City, is the making of comprehensive and accurate topographical maps. It is only on the basis

PITTSBURGH—INTRODUCTION

of such maps that all municipal engineering, and indeed much other work directly managed by the City, can be planned and carried out with proper economy and efficiency. It is only on the basis of such maps that improvements in the city—details of city replanning—can be most economically determined. And in the outlying districts, where the future city is being built, such maps are absolutely essential to an intelligent planning or control which will avoid the heavy penalties that follow haphazard city growth, especially in such a hilly region.



Comparative diagram showing the volume and the estimated gross tonnage of traffic on the thoroughfares leading into the Down Town District

PITTSBURGH CIVIC COMMISSION
GENERAL PLAN
OF THE
DOWN TOWN DISTRICT

SCALE
100 0 200 400 600 800

FREDERICK LAW OLNSTED
CONSULTANT ON CITY PLANNING





PART I

The Down Town District

THE down town district is substantially that part of the city known as the Point District. It is bounded by the two rivers and by the steep hills to the eastward, and within this section of the city, as elsewhere, the basic problem is that of the means of transportation—specifically the problem of the street plan. There is a daily circulation of inward and outward travel to be borne by a limited number of main arteries, of which those leading to most of the tributary districts are bridges. It is clear that the bridges can be enlarged or increased in number at any time when the volume of travel justifies the expense of reconstruction.

The Main
Arteries

Considering the fact that Pittsburgh is a world capital in the steel bridge industry, that its busiest quarters are sundered by three of the world's big rivers, and that it is traversed in every direction by ravines which demand the construction of mighty viaducts, it is a striking and rather shameful thing that it does not possess a single bridge over its rivers that is notable among the bridges of the world either for its beauty, for its perfect engineering adaptation to its purpose, for its size, strength or amplitude. In fact the bridges of Pittsburgh, compared with those of other great cities, are rather unusually limited in capacity and lacking in the qualities of impressiveness and beauty.

It is a case of



A one-span bridge across the Danube at Budapest

6 PITTSBURGH—THE DOWN TOWN DISTRICT

the cobbler's children going barefoot: when a man sells shoes at wholesale in every quarter of the globe, it is time for his own family to be well shod. Pittsburgh can afford to have, and owes it to herself to have, the very best of bridges. No time or pains or reasonable expense should be spared in planning future bridges, whether they be on new locations or to replace existing structures, to get the best designs that the highest engineering skill combined with the highest artistic ability can produce. Bridge-builders everywhere should be enabled to think of Pittsburgh not merely as a source of cheap raw material for bridges, but as an all-round leader in the bridge-building art.

To the eastward, where the most active growth of the city has been taking place, the arteries consist not of bridges over open rivers, but of streets, very limited in number by reason of the form of the land, and so situated that the cost of securing greater capacity will increase by leaps and bounds with the rise of land values and the erection of new structures. The first step in plan-



Bridge of distinctive character at Budapest

ning improvements for the heart of the city must therefore be to consider the possibilities for improvement in the eastward arteries.

Eastward Arteries and Their Improvement

There are only three places where such arteries could ever have been laid out, even if the wisest foresight had been exercised in the early planning of the city when all was free and open. These three places are around the north edge of the hills along the Allegheny, around the south edge of the hills along the Monongahela, and through the gap in the hills followed by Fifth Avenue and Forbes Street.

The northerly route is followed by Penn and Liberty Avenues,

by the Pennsylvania Railroad, and by Grant Boulevard clinging to the hillside above the railroad. The space between Penn Avenue and the river is largely occupied by railroads and by business dependent upon the railroads, and there seems to be no possibility of opening any new line for relief, except in so far as a subway might reduce the number of people inconvenienced by delays on the surface. On account of its gradients and of the districts toward which it leads at both ends, the usefulness of Grant Boulevard seems likely to remain confined to light passenger traffic, chiefly automobiles. In any case all the teaming and surface traffic of a very large region must be carried through the throat on the lower level. It is important also to note that the only street which passes through the down town district with more than village dimensions—eighty-foot Liberty Avenue—leads directly to this throat and then chokes down to a fifty-foot street.

It may safely be said that increased capacity for east and west general traffic north of the hills can be secured only by a radical widening of Liberty Avenue or Penn Avenue. Upon the whole the latter seems the more advantageous route. On the score of cost there seems to be but little choice; on the score of value in the result Penn Avenue is the better. To have one side of such an important avenue flanked by a railroad to the exclusion of general business frontage would make it less agreeable as a thoroughfare and less productive as a real estate proposition. On the other hand if Penn Avenue is widened the narrow portion of Liberty, above Eleventh Street and next the railroad, will be important almost solely for local purposes; warehouses or factories could be erected extending through from the principal, or Penn Avenue, frontage to Liberty Avenue, and could be provided with sidings from the railroad passing over Liberty.

Further details as to this suggested widening of Penn Avenue and its connections eastward are given, along with other highway improvements, in Part II of this report. But considering here only its relation to the down town district, this widening will undoubtedly throw increased emphasis upon Penn and Liberty Avenues as traffic lines within this district; and it is obvious that a good cross-connection should be provided so that east-bound traffic coming from Liberty Avenue and from Grant

8 PITTSBURGH—THE DOWN TOWN DISTRICT

Street, as well as from Penn Avenue, can freely reach the widened portion of the latter. A traffic square at the angle in front of the Union Station, where the broad part of Liberty Avenue ends and the narrow part begins, would furnish the desired connection. Fortunately such a square can now be formed with the destruction of but few buildings and those of relatively little cost.*

The street along the Monongahela—Second Avenue—although it might have been made of great importance and value by proper planning at the start, cannot at the present time be greatly widened without the most serious difficulties. For much of its



Second Avenue between Try Street and the
Tenth Street Bridge

length it is pinched between railroads and industrial plants. It does not lead eastward into any district comparable in population or importance with those tapped by Penn and Liberty Avenues, and its connection westward through the

Point District is narrow, difficult to widen, and relatively unimportant. For these reasons Second Avenue, although it must be recognized as a main thoroughfare and should be improved as much as practicable, especially as far east as the Tenth Street bridge, is not of such first-class importance as to demand radical enlargement in spite of all obstacles.

The only remaining natural outlet to the east is that occupied by Fifth Avenue and Forbes Street and the block between them. Neither street is wide enough for the traffic it will be called upon to bear, but the widening of Fifth Avenue would be so costly as to be almost out of the question. For many reasons, discussed in detail in Part II, the widening of Forbes Street into an ample main thoroughfare seems to be the best solution of the problem here presented.

The importance of this route and of its future traffic burden

* See Plan of the Down Town District.

will be better realized when it is understood that at Soho a direct extension can be made, on easy gradients, from the widened Forbes Street to Fifth Avenue, the street which can more easily be widened beyond that point; and further, that, a little to the east, a new and greatly needed street might branch off to the right from Forbes Street where the latter turns inland. This new street would continue along the side hill above the river, and would provide the only possible convenient outlet from the down town district to all the upland regions south and southwest of Squirrel Hill. Thus the western portion of Forbes Street, when widened, would carry the great bulk of all future street traffic between the down town district and the whole district from East Liberty to the Monongahela River as well as all the country east and south-east of that triangle.

A New Traffic Center The intersection of Forbes Street, widened, with Sixth Avenue, extended, is likely to become a traffic center of the utmost consequence to Pittsburgh.

The importance of the Forbes Street route to the eastward has been indicated above; Sixth Avenue, crossing Fifth Avenue and Grant Street, leads toward the Union Station and toward all the northeast part of the business district, and to the North Side bridges; a new bridge and tunnel are quite likely to lead from this very intersection to the South Side and the South Hills; from this center a good connection is readily obtainable with Fourth, Third, and Second Avenues and with the southern water front; and Diamond Street can be widened at moderate expense so as to continue Forbes Street right through the heart of the business district.

Sixth Avenue The importance of Sixth Avenue between Forbes and Grant Streets has been pointed out. It is the natural route from the Union Station and the adjacent freight yards and from all the Allegheny bridges to the districts fed by Fifth Avenue, Forbes Street, the proposed South Hills bridge, and Second Avenue. It ought to be widened to the dimensions of a main thoroughfare, and its grade ought to be lessened. Its stream of travel splits at Grant Street, a portion turning to the left into the other part of Sixth Avenue, and a portion turning to the right along Grant Street to Liberty Avenue and the freight yards. The latter obviously is a very important line, and

the off-set which it makes at Seventh Avenue is so serious that the corner ought to be cut.

Try Street
Grade Crossing The elimination of the grade crossing of Second Avenue with the Panhandle Road at Try Street is a pressing improvement. The avenue now descends toward the railroad from both directions, and the best plan appears to be to carry it over the tracks. In this way Second Avenue would connect directly (through the west side of the Civic Center) with Forbes Street; with Fourth, Fifth, and Sixth Avenues, and so with the Union Station and the Allegheny Valley; with the main or upper deck of the South Hills bridge rising across the river to the proposed tunnel; and with the suggested lower deck of that bridge leading to the South Side. In order to secure a good gradient, the westerly approach of Second Avenue should start from Grant Street, rising on an incline or viaduct through the so-called park and the street on one side of it, in order to pass over Ross Street. In this way there would be no interference with the teaming through Ross Street to the Baltimore and Ohio freight yards.

Second Avenue
Freight Yards Mention should here be made of a plan, which it is understood is already being considered, to develop the area between Second Avenue and the river, from Try Street to the Tenth Street bridge, for freight purposes. Even now the connections from this region to the Tenth Street and Smithfield Street bridges, and, via First and Second Avenues, to the whole Point District, are good. But the street changes proposed in connection with the traffic center at Sixth Avenue and Forbes Street will provide greatly improved connections directly to the Point District, the East End and the South Hills. First Avenue and Water Street would enter the freight yard underneath the Panhandle and the proposed Baltimore and Ohio local tracks; and if Second Avenue is raised to go over the Panhandle tracks, as recommended above, direct entrances can be secured to the second or third floor of a freight house with car elevators such as those at St. Louis. On the whole this seems like a good place for a large distributing freight station.

The "Hump Cut," The Sixth Avenue improvement, and others in the vicinity, are bound up with the question of the "Hump Cut." Pushing to one side all differences of opinion

as to the *local* effect of the proposed cut,—its influence on land values, and the share of the cost which ought to be borne by abutters,—the fact stands out that the City as a whole needs the improvement in order to clear an obstruction from some of its most important general highways. Another fact, seen clearly from this larger point of view, is that the essential matter is to secure a radical reduction of the maximum gradients on the three great thoroughfare lines, Sixth Avenue, Fifth Avenue, and Diamond Street, even though the minor streets on the margins of the Hump be skimmed. Detailed recommendations, as to gradients, etc., are discussed in Part V and are embodied in the accompanying plans and profiles.

Grant Boulevard Extension

Only one other thoroughfare problem is involved with the "Hump Cut," that of Grant Boulevard extension. Since the grade of Webster Avenue will be considerably lowered in connection with the "Hump Cut," and the buildings along its lower end greatly damaged in any case, by far the best plan for Grant Boulevard is to carry it straight through to Webster Avenue and to widen the lower end of the latter to 60 feet, as far as Grant Street. The widen-

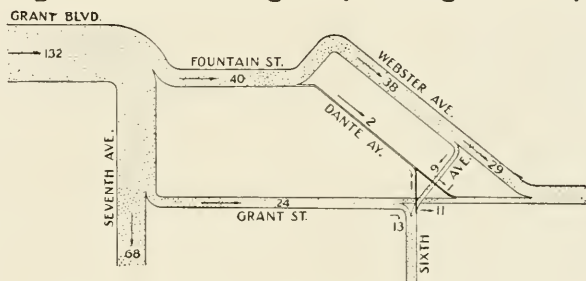


Diagram showing the distribution of automobiles coming in town on Grant Boulevard

ing of Oliver Avenue to 50 feet between Grant and Smithfield Streets, and the possible widening of Strawberry Way, would, together with existing streets, provide adequate means of distribution for the large number of automobiles using the boulevard, and would at the same time create a decided local improvement.

A Civic Center

The location of a Civic Center, where the city offices can be grouped in a convenient and dignified manner, ought to connect with the main transportation lines. It ought, if possible, to embrace the county buildings. It ought, if possible, to occupy land which is not of such high cost as to preclude the setting apart of the open space which is requisite to the highest dignity and beauty of public buildings. All these

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County Buildings—the northwest side of the proposed Civic Center

advantages are embraced to a high degree in a locality now so unpromising and unattractive that it is hard not to feel an unfair prejudice against it.

The locality in question lies to the east and southeast of the present county buildings. It embraces a bit of low ground occupied by the little Panhandle station and local freight yard, surrounded, except for the county buildings, by vacant lands and cheap buildings at various higher levels, mounting on the east to the commanding ridge that dominates all this part of the city. Through this locality the Forbes and Diamond Street thoroughfare and the South Hills and Sixth Avenue thorough-



Present appearance of the Civic Center site from the rear of the County Buildings

fare will pass. Fifth Avenue borders it on the north, and Second Avenue on the south. It is flanked on the northwest by



Princes Street in Edinburgh—an interesting example of a public garden built over a railroad

the noble and distinguished architecture of the court house and the jail—masterpieces of Richardson, priceless examples of the work of one of the few great artists America has yet produced. To the west a new

county building is about to be erected. It is proposed that the central area of low ground, occupied by the railroad, be decked over at about the level of Fifth Avenue, and that a great public square with gardens be laid out thereon somewhat after the manner of the celebrated public gardens built over the railroad at Princes Street, Edinburgh, or, in a much smaller way, at Park Avenue, New York. Below the structure would simply be a first class station and freight sheds of permanent construction, with skylights and ventilators, at suitable locations, piercing a flat roof of adequate



Suggestion for the Municipal Building in the Civic Center

14 PITTSBURGH—THE DOWN TOWN DISTRICT

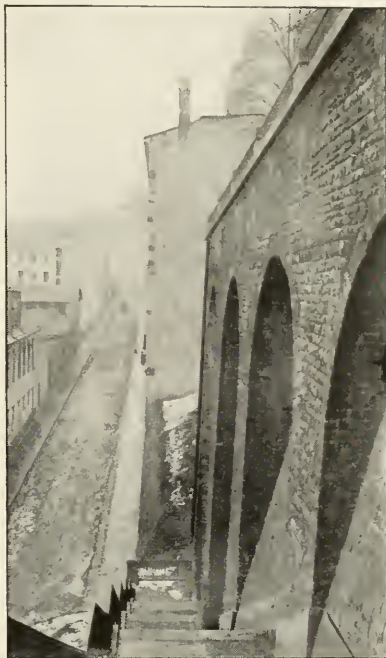
strength. The cost of construction would be less than the cost of an equal area of land independently acquired for an open space in connection with a Civic Center in any other locality that could reasonably be considered.



Sketch of the proposed Civic Center for Pittsburgh, looking south. The crossing of tracks in center of foreground is at the present corner of Sixth Avenue and Forbes Street

Along the east side of this square or garden, in the form of a gradually rising terrace, would run the approach to the new South Hills bridge ascending gently from Forbes Street; and on the east side of this again, as though terraced on the hillside,

would be the principal municipal building culminating in a tower which would spring from the highest level at Bluff Street, where the playground of the Holy Ghost College could be utilized as a park. The group enclosing the square would be completed by another building at the north with frontage on Forbes Street, Fifth Avenue, and Sixth Avenue, and by a low building on the south serving to screen the factories and freight yards south of Second Avenue but leaving open the view of the opposite hills. The plan and the sketch perspectives indicate in a general way the sort of architectural development for which the situation appears to call. The pronounced and unsymmetrical differences in elevation, the slanting grade of the approach to the great South Hills bridge, the irregular and picturesque form of the site and of the existing county buildings, all seem to demand a certain informality and picturesqueness of design. These peculiarities of the site ought to be welcomed because they are eminently characteristic of the city and of the mountainous region in which it



Retaining wall supporting a local park at Lyons—a suggestion for the bluff between Second Avenue and the new City Hall.

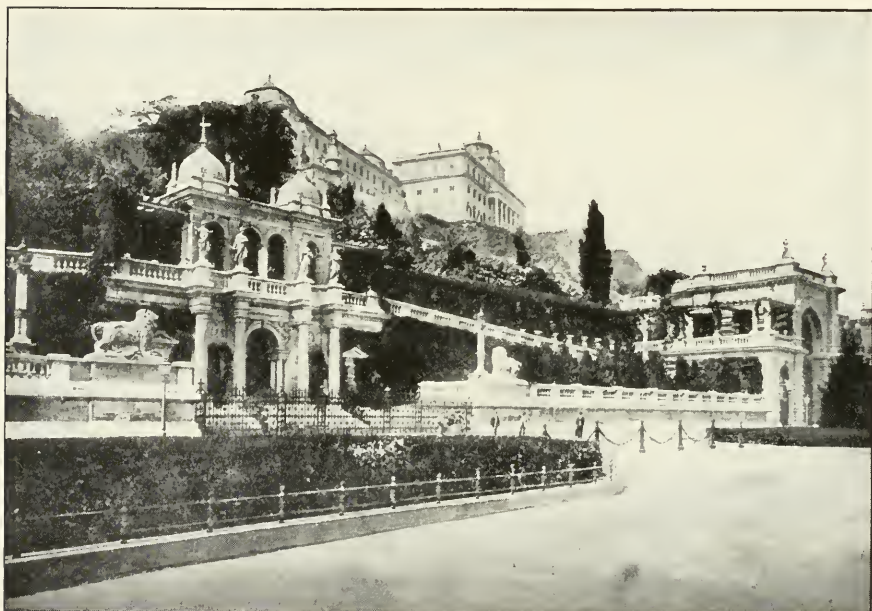


Hillside site of the proposed City Hall

is set. Throughout the city and its surroundings the one preëminent quality of an agreeable sort is the bold picturesqueness of the landscape—the deep ravines, the lofty hills, the precipi-



The Cathedral Terrace at Bern; a suggestion for utilizing a high situation for public buildings and grounds



The hillside of Ofen at Budapest, an interesting treatment of the slope crowned by a public building

tous declivities, the plunging prospects from hilltops into the river valleys—and a similar quality of forcefulness, activity, and bold, irregular adaptation of means to ends, is to be felt in all the more dominant and impressive works of man in the city—the steel works, the bridges and viaducts, the jagged sky-line of office buildings. To build a City Hall and Civic Center of scholastic formality, appropriate in the placid surroundings of Paris, would be to lose a great esthetic opportunity.

**Diamond Street
Widening**

It would be difficult to overestimate the value, to the future convenience prosperity and business efficiency of the city, of carrying the Forbes Street improvement straight through to a junction with Liberty Avenue on the line of Diamond Street; and it is deemed a peculiarly fortunate thing that this is the only east and west line in the midst of the business district where a wide street can still be put through without destroying any considerable number of costly modern buildings.

When Diamond Alley was widened, in part, from 20 feet to 50 feet, not long ago, the improvement was of much importance because it added one more street large enough for general business in a locality where there was a great demand for business frontage, and where the original lots were of very excessive depth. But the improvement was a distinctly local one and contributed little or nothing to the solution of the general traffic problem. But the peculiar relation of Diamond Street to the general system of main traffic lines demands a much more courageous action for the benefit of the whole city. In connection with the widening of Forbes Street, it should be converted into a thoroughfare at least equal in width to Liberty Avenue. A glance at the map shows the convenient and equitable location of Diamond Street, and its importance as a thoroughfare to supplement Liberty Avenue in handling the traffic of the Point District.

**Market Street
Widening**

Coming, as it does, directly opposite the Sixth Street bridge, Market Street ought to be a very important cross-town connection; and because the buildings are generally small and old, and most of the lots are so deep as not to be seriously injured by curtailment, a widening is suggested throughout its length.

The widening of Diamond and Market Streets makes clear that the Diamond Square Market site should not be occupied in any way that would perpetuate the obstruction offered by the present use of the square to through travel. The need is not for a mere mitigation or slight improvement of the present conditions by opening little archways through a new building on the Market site, but for a radical and effective clearance. The space was originally set apart as an open public square, and the complete occupation of it by revenue-producing buildings was a diversion of the square from its original purpose—an act in general accordance with the unfortunately short-sighted policy which has done much to bring about the notably congested conditions prevailing in the city today.

The Market

It may be necessary to provide elsewhere for the Market, and a site is suggested in the block between Third and Fourth Streets on Liberty Avenue, having the



A bridge and water front at Pittsburgh—Monongahela River

great advantage of rail connections. On account of the character of the surrounding country, an exceptionally large proportion of market supplies comes to Pittsburgh by rail and must continue to do so. It is highly uneconomical, and adds need-

lessly and considerably to the congestion of the streets, to unload the market supplies from the railroad a full mile away (as is now done) and to then haul them by team through the heart of the retail district.*

Within the interior of the Point District, Diamond and Market Streets widened, supplemented by the existing Liberty Avenue, appear to be the only thoroughfares of Metropolitan dimensions which it is reasonable to provide for. But around the borders of the district there is much that ought to be done.

*A general discussion of the Market problem is included in Part V.

The Water
Front

In its water front Pittsburgh has a great public asset which now lies undeveloped both from the point of view of transportation and from that of recreation and civic beauty.

As a transportation factor, its primary use is for the trans-shipment of water-born commodities.



Primitive commercial quay at Pittsburgh—Allegheny River

As discussed elsewhere,* the actual amount of river freight is at present relatively small; but it is potentially important, and one of the reasons for its lack of growth is the neglect of Pittsburgh and

other river ports to provide for the quick, convenient, and economical handling of river-born traffic at the public wharf.

At river ports throughout the world, the first primitive step, beyond the mere dumping of stuff and passengers on the natural shelving bank or river bed of mud or gravel, is the paving of the slope, as at Pittsburgh, still leaving the goods to be dragged up and down the bank by main force. But among the live modern river cities of Europe, wherever a real water competition with rail service has been desired, even though such competition be limited in its range, the day of the primitive or mud-bank type of shore has long gone by; and



Berlin water front, both useful and attractive

*The City and the Allegheny River Bridges, Part V.

the public wharf has been reconstructed into one of the many well-recognized types of commercial embankment providing an up-to-date equipment for handling freight, and decent, attractive conditions for passengers. This development of the public wharf properties in Europe has kept pace with the activities of the railroads, making for the steady and intelligent improvement of terminal facilities. Indeed in many European river ports the im-



Frankfurt's double use of its river front, for business and for pleasure

provement of the water terminals has rather forced the pace for the railroads.

In contrast to this active aggressive spirit, Pittsburgh, like most American river towns, where she has not actually turned her water front over bodily to the railroads, has left it in a most inefficient primitive condition.

But the value of Pittsburgh's water front lies not merely in its use as a wharf, however much improved. Another use, shown by the varied experiences of other river cities, is that, in a commercial water front on modern lines, there is generally opportunity for a wide marginal thoroughfare for the relief of traffic congestion in the adjacent streets. Sometimes such a water-front thoroughfare becomes a busy avenue of retail trade and general travel; but more usually its peculiar value lies in diverting some of the main streams of heavy teaming from the older interior streets where the retail trade and office business tend to concentrate, and where the

passenger travel is most dense. Especially with an isolated and limited business district like that of Pittsburgh, made up almost wholly of narrow streets and connected with the rest of the city by a series of bridges and of bridge-like gaps in the hills which wall it in, it becomes of the utmost importance to secure the formation of a wide circuit street connecting these outlets together, so that not all the travel is forced to filter slowly through the midst of the business district.



Shaded promenade upon the embankment that protects Lyons from the floods of the Rhone

A third undeveloped asset of the Pittsburgh water front is its value for recreation and as an element of civic comeliness and self-respect. One of the deplorable consequences of the short-sighted and wasteful commercialism of the later nineteenth century lay in its disregard of what might have been the esthetic by-products of economic improvement; in the false impression



View of the same water front at Lyons, showing the commercial quay

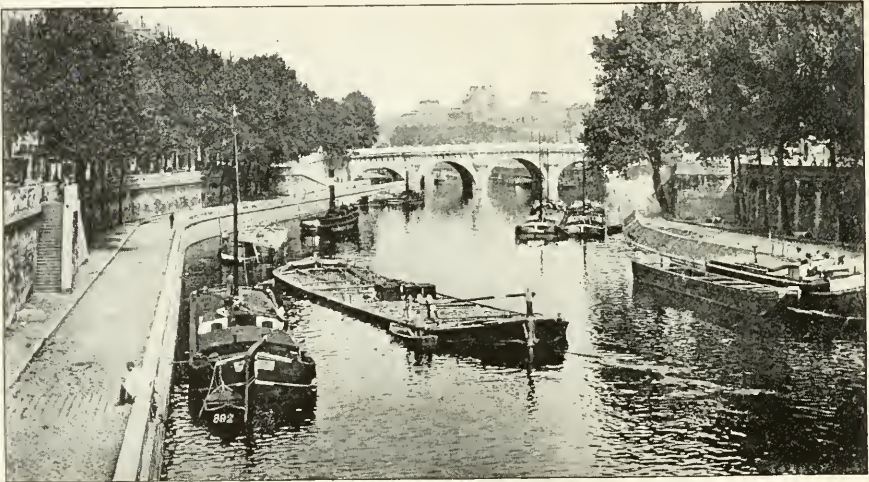
spread abroad that economical and useful things were normally ugly; and in the vicious idea which followed, that beauty and the higher pleasures of civilized life were to be sought only in things otherwise useless. Thus the

pursuit of beauty was confounded with extravagance.

Among the most significant illustrations of the fallacy of such ideas are the comeliness and the incidental recreation value which attach to many of the commercial water fronts of European river

ports, and it is along such lines that Pittsburgh still has opportunity for redeeming the sordid aspect of its business center.

Wherever in the world, as an incident of the highways and wharves along its riverbanks, a city has provided opportunity for the people to walk and sit under pleasant conditions where they can watch the water and the life upon it, where they can enjoy the breadth of outlook and the sight of the open sky and the opposite bank and the reflections in the stream, the result has added to the comeliness of the city itself, the health and happiness of the people and their loyalty and local pride. This has been true in the case of a bare, paved promenade, running along like an elevated railroad over the sheds and tracks and derricks of a busy ocean port, as at Antwerp; in the case



How Paris appreciates the value of its river frontage

of a tree-shaded sidewalk along a commercial street with the river quays below it, as at Paris and Lyons and hundreds of lesser cities; and in the case of a broad embankment garden won from the mud-banks by dredging and filling, as at London. Pittsburgh has an unusual opportunity to secure this incidental value for recreation in the treatment of its river front. Immediately across the Monongahela are the high and rugged hillsides of Mt. Washington and Duquesne Heights, and below these are the lesser but still striking hills along the Ohio River from the West End to McKees Rocks. The outlook over the river

with its varied activities to these hills immediately beyond, would be notable in any part of the world. Furthermore, the rivers and the hills are the two big fundamental natural elements charac-



The outlook from The Point, Pittsburgh

teristic of the Pittsburgh District. Thus, any provision close to the heart of the city, whereby the people can have the enjoyment of these mighty landscapes, is of peculiar importance.

It does not diminish the essential grandeur of the situation that

the river swarms with barges and steamers; that it is spanned by busy bridges; that the flat lands along the rivers are crowded with railroads, buildings and smoking factories; and that the hillsides are crowned with houses. It is a spacious and impressive landscape in any case. But for the people to get the good of it two things are needful. A locally agreeable place must be provided from which the scene can be enjoyed; and the landscape must be treated with the respect which it deserves, by the elimination of certain features which are merely indicative of neglect, waste, and abuse, and which have no economic justification. Especially is it desirable that the precipitous hillside rising to Mt. Washington, now largely an unfruitful waste, a place of raw gulleys and slides min-



Mt. Washington hillside from the Monongahela water front

gled with some painful advertising signs, should be treated with respect as a vital part of the great landscape of the city. It should be protected from defacement and its earthy portions should be reclothed with the beauty of foliage.

The accompanying illustrations are suggestive of the sort of thing which might be done by Pittsburgh with its remaining public water front, and in time, let us hope, with portions of the water front which have passed into private hands. But the actual details of the treatment to be adopted can be properly worked



Water front and hillside at Lyons

out only in connection with the comprehensive plans for flood protection with which the Flood Commission is now grappling.

The great majority of river cities which have undertaken modern improvements on their water fronts have had to deal with more or less serious flood problems, and the complex and varying conditions of each river have had an important influence on the design of the embankment. The technical problems involved in the control of rivers are among the most complex and baffling with which the engineering profession has to deal, and any attempt to forestall the investigations of the Flood Commission, by definite plans for permanent improvements on the water front, would be folly. Nevertheless, the experience of hundreds of cities and the work of thousands of engineers have developed certain types of treatment, one or more of which, with suitable

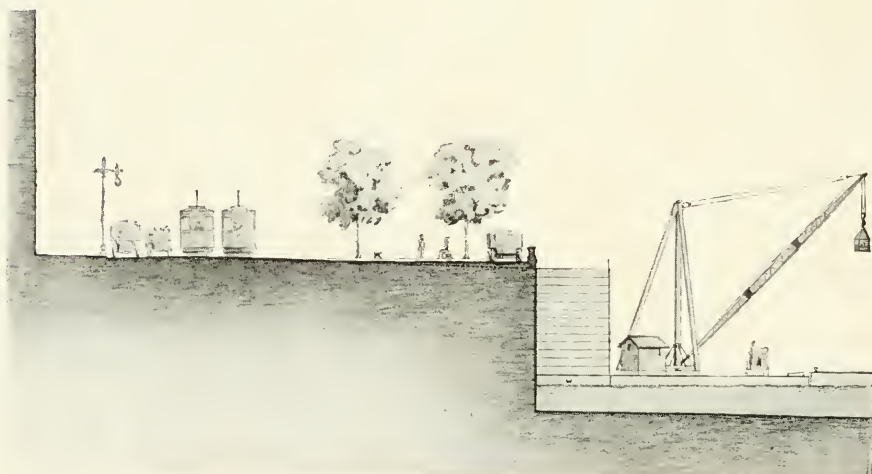
local modifications, will pretty surely appear in the final solution of the Pittsburgh problem. Subject, therefore, to the conclusions of the Flood Commission, a satisfactory development of the Pittsburgh wharf may be expected to include the following features.

First, there should be an amply wide water-front street, presumably formed by extending Water Street and Duquesne Way over the upper part of the present sloping bank. Second, the outer sidewalk of this street should become at most points a tree-shaded promenade, of such width and with such equipment of benches and other features for public recreation as the circumstances permit, so arranged that the people using it will neither be in the way of the transportation activities nor be annoyed or endangered by them, and so designed that the people can enjoy to the full the natural beauty of the river valley and the always interesting activities of which it is the stage. Third, there should be next the water a commercial quay, substantially level, of adequate but not unnecessary width, and accessible from the streets by inclined roads of reasonable gradient, parallel with the river, in place of the present excessive slopes.

In the first typical section here given is shown one such arrangement. Here, the level of the promenade is such that its solid parapet rises above the maximum flood level. This is of a type adopted for rivers that are subject to occasional excessive floods, as at Pittsburgh. It assumes the embankment to be made water-tight; the sewers and drains to be provided with proper back-pressure gates, and the openings from the streets, through the promenade and its parapet to the commercial quay, to be arranged for prompt damming on the rise of the water above the danger level. Thus would the entire business district be protected from floods, not only on the surface but also in the basements. The quay shown on this section is supposed to be at a level just above ordinary navigable stages, and to be equipped with power cranes for direct loading and unloading between steamers or barges, tied up at the quay, and wagons upon it. Provision could also be made for a freight track running in alongside the cranes for transfer between cars and vessels (if thought desirable), in addition to the facilities provided on railroad property. Alongside the quay, floating landing-stages for packets and so forth, reached by gang-planks or bridges, would



Typical section for the water front. The parapet along the promenade would be above extreme flood height ; the commercial quay would be at a lower level, flooded at very high water, but above all ordinary river stages.



Alternative section for the water front, suggesting a floating commercial quay that would rise and fall with the river. Large cranes could transfer freight directly from the boats to trucks at the street level. At certain places roadways would cut through the promenade to provide access to ramps leading down to the quays and to provide places for freight trucks to stand while being loaded and unloaded.

be provided as at present, but in a more decent and commodious style.

This section is of a type tested by practical experience and is clearly a great improvement upon the present primitive conditions. But it is open to two objections: first, that the quay is flooded at intervals, although so designed as to suffer no injury and to be put out of commission only when the river is practically closed to navigation by the height of the flood; and, second, that at low water, that is to say "pool full," it is not at the most convenient height.

An alternative section is therefore suggested, which has less precedent behind it, but which might prove better adapted to the Pittsburgh conditions. In this the fixed level of the commercial quay is replaced by a continuous landing stage formed of long floats or barges, of permanent construction, moored against the wall and free to rise and fall with the changing level of the river. The approaches to the floating quay for wagons would be, as in the case of the fixed quay, by descending inclines parallel with the river just outside the main wall; but in this case the roadway would be formed by a line of barges which would rest on a fixed incline during low water. The rising water would lift the barges off the incline successively, beginning with the lowest, so that at all stages of the water they would maintain an uninterrupted roadway to the quay on a proper gradient. Successful precedents for such use of permanent floating quays, and of alternately floating and grounded driveways to the landing stage, are to be found in Italy and in the recent harbor developments at Manaus, Brazil.

A great advantage of the floating quay is that in this type of construction the bed of the river may be excavated to its full depth back to the face of the flood wall itself, and that the space necessary for the commercial quay is secured on the floating structure outside of this line without materially reducing the prism, or section, of the flood discharge. It would therefore be possible, with this design, to secure more ample width for street, for promenade, and for commercial quay, and at the same time have more space in the river for the passage of the floods.

Whatever may prove to be the best details of the river-front treatment, it is clear that it can and should provide an ample

thoroughfare, a clean, pleasant, tree-shaded promenade, and a convenient, up-to-date wharf with easy access to and from the streets. There is no serious difficulty in providing for such an improvement from the junction of the two bridges at The Point to Ninth Street, on the Allegheny, and to Smithfield Street, on the Monongahela.

East of Smithfield Street the passenger station of the Baltimore & Ohio now blocks the way. But it is not unreasonable to expect that the main Baltimore & Ohio station will, before long, be moved to some point in Junction Hollow in order to avoid the long delay, to all through trains, caused by the run down to Smithfield Street and back again. The suburban business of the Baltimore & Ohio could then be turned in, parallel with the Panhandle tracks, to a new joint suburban station in connection with the important future center of traffic near the junction of Forbes and Diamond Streets with Sixth Avenue and the proposed South Hill bridge.

When the Baltimore & Ohio passenger station is removed from Smithfield Street it would be possible to continue the new water-front street and promenade east of Smithfield on a viaduct just outside of the present Water Street; this viaduct would rise over the Baltimore & Ohio freight yard and the grade entrances thereto at Grant and Ross Streets, and so connect along the line of the Panhandle (Try Street) with the proposed Second Avenue bridge over the railroad, and thence with Forbes Street and Sixth Avenue.

Any better connection than now exists from Ninth Street and Duquesne Way to Liberty Avenue would be so costly as to seem hardly worth while, although it would be a much-desired link in the circuit thoroughfare.

It is probably impossible for Pittsburghers, who are familiar with the present neglected aspect of the water front and are not familiar with the finer European quays, to form any conception of how fine a situation will be created for public or private buildings, especially on the southern water front when thus improved. If it were not so much to one side of the main streams of passenger travel, the river frontage between Smithfield and Ferry Streets would offer a most admirable site for public buildings in the down town district.

The Improve-
ment of The
Point

At the opposite end of the business district from the proposed Civic Center is another spot where the civic pride of Pittsburgh should lead the City to make liberal expenditures for other than the economic ends which justify those Street improvements which are the main burden of this report.

At the end of The Point, where the two lines of water-front improvement would join, is a considerable area of public open space. Here is the spot where the Ohio River has its birth: here



Water front park and an interesting bridge at Bonn, Germany

was built the fort which broke the peace of Europe and around which turned the frontier struggles of the war that gave America to the English speaking race. It is here that all the most inspiring associations of the city are chiefly concentrated. Poetically, this spot, at the meeting of the rivers, stands for Pittsburgh.

Because the eastward drift of the business center has followed the eastward drift of residences, and the growth of business has not yet expanded back to fill the void; and because The Point is left pocketed beyond the freight yards, and is visited only by the throngs who use the old Point bridge, it seems to be rather forgotten and disregarded by most Pittsburghers. But its historical and topographical significance can never be altered, and it is to be hoped that the City will rise to its opportunity and nobly form The Point into a great monument.

The North Point bridge is about to be rebuilt; the South Point bridge is very narrow and some day must be rebuilt in its own turn. In the placing of these bridges, in every feature of their design and of the design and decoration of their approaches, the monumental element ought always to control. The plan shown herewith in outline is an attempt to solve, in a dignified and monumental way, the obvious problems presented by the bridges and the means of approach to them. Whether just this plan or some better one be adopted, it is essential that the whole Point be regarded as one single monument, that no pains be spared in bringing the best artistic skill to bear in working out the details of the plan, and that the general plan, when thus worked out, shall really determine the construction of all the parts. At any time conditions may arise, as in regard to one of the bridges, for which the general plan does not exactly provide; but, if so, the plan should be adapted as a *whole* to meet the new conditions, so that work may still proceed in accordance with a complete plan. Never can a single feature of The Point safely be designed independent of the rest, if worthy results are to be obtained. And what is true of this great monumental feature is true in large measure of all public improvements in relation to a comprehensive city plan.

PART II

Main Thoroughfares

IN considering the economical widths for the main thoroughfares of a city, so many complex factors are involved that no exact and indisputable conclusions can be reached; but there are certain facts and principles that ought to remove such decisions from the realm of purely arbitrary whim and custom by which they are now generally settled. Practically every normal main thoroughfare, even of the most compact type, must provide for car tracks in the middle. On straight runs, according to the present practice and with the new cars in Pittsburgh, the width occupied from the outside of one car to the outside of the other is 17 feet 8½ inches. At that, the cars are narrower than the modern standard in some other American cities, and the clearance between the cars is reduced to less than a reasonable requirement for safety. On curving roads, such as the Pittsburgh topography often imposes, the space occupied is greater. Without allowing any clearance on the outside, a space not less than 18 feet, and preferably more, should be allowed for the actual cars on straight runs.

Width of
Thoroughfares

In Pittsburgh, the gauge of the car tracks was originally made to conform to the prevailing local gauge of other vehicles, on the mistaken theory that it was desirable to have the smooth tracks used by wagons; and this has resulted in the almost invariable conformity of the wagon gauge to that of the tracks, regardless of the size or character of the vehicle. With the added fact that Pittsburgh pavements are prevailingly bad, and that the form of rail is such that it is very difficult for a wagon to turn out when it has once got into the track, the teamsters in Pittsburgh are more inveterate in the habit of driving in the car tracks, and less ready to turn aside for cars or other vehicles, than in most cities. The severe and constantly repeated strain of the horses, which is required to wrench heavily-loaded wagons free

from the tracks, is, in the aggregate, a serious economic loss; and the delays not only to the street cars but to all forms of wheeled traffic, caused by the conditions described, are incalculably great. But even good pavements and the use of a grooved rail would not cure the trouble in Pittsburgh streets as now laid out, because, almost universally, there is not sufficient room for a vehicle to pass between the cars and another vehicle standing or slowly moving next the curb.

In every street, vehicles must be free to stop for loading and unloading, and on a busy thoroughfare the space next the curb is so much used in this manner as to become merely a series of sidings into which slow-moving vehicles can turn from time to time in order to clear the main passageway. The result of the conditions above described is that practically the whole wheeled traffic in Pittsburgh streets is inevitably concentrated on the eighteen-foot width where the cars run. The extent to which this reduces the average speed of travel and the total capacity of the thoroughfare has been strikingly illustrated for Pittsburghers by the contrast of the former sluggish congestion of traffic on Smithfield Street with the sparse appearance and rapid movement of the same traffic since the "one-way" regulations have made it possible to get one free line in each direction for moving vehicles separate from the cars. The same striking increase in capacity is to be secured, without the grave inconveniences and drawbacks of the "one-way street" regulations, where the space between the cars and the curb can be made wide enough for two lines of vehicles, instead of just enough for one or for one and a half, as is usual in Pittsburgh.

It is very difficult to determine just what is the most economical allowance of width. There is much variation in the widths of the vehicles themselves, and the necessary amount of clearance varies with the average skill of the drivers and with the effectiveness of the police control. The width of the line is plainly determined by the widest vehicles in it rather than by the narrowest. In Pittsburgh the customary width of the heavier and wider wagons is now controlled by the practical necessity of fitting the wheels to the railway gauge of 5 feet 2½ inches, and the widths are considerably less than prevail in New York, Boston, and other reasonably well-paved cities where the wagons are not fitted to

the car tracks. About 7 feet over all is now the ordinary maximum in Pittsburgh, a few auto trucks and delivery vans exceeding that figure slightly, and an occasional three-horse team occupying over 8 feet. In New York and Boston, wagons measuring from 7 to 8 feet from hub to hub are common, and they sometimes considerably exceed 8 feet.

Just as in the case of steam and electric railway equipment, the tendency is constantly in the direction of heavier, longer, wider vehicles, for the sake of the operating economy due to large units; and, with the steady increase in the use of motor vehicles for business purposes, this tendency is likely to be greatly accelerated. There is every reason to expect that motor trucks will gradually increase in size until a limit is fixed by the public authorities in order to protect the pavements, and for the sake of standardizing the lines of travel in relation to the street widths. But, in the interests of economy of operation, the limit should be as high as practicable, probably not less than 8 feet.

If 8 feet be allowed for each vehicle, plus only a foot of clearance, the cars and one row of vehicles on each side, between them and the vehicles standing at the curb, would require 54 feet between curbs. A wagon *backed* up to the curb on a busy street will seriously discommode travel at that, and the clearance allowed is very small. A width of 54 to 60 feet between curbs is, therefore, highly desirable in the main thoroughfares.

As a matter of fact, with the widths of vehicles which now prevail in Pittsburgh, if standing and slow-moving vehicles are compelled to keep in contact with the curb, it is possible to keep open a line of travel on each side of the car tracks, with only occasional blockades, where the width between curbs is 50 feet, or, at a pinch, even 48 or 47 feet. That is to say, the difference in traffic capacity between a thoroughfare 50 feet from curb to curb and one 45 feet is enormous; while the difference between 45 feet and 40 feet is very slight.

Since a main thoroughfare is apt in time to become a retail trading street, wide sidewalk space is important. It is a common rule to make the distance of the curb from the property line one-third the width of the roadway.

A total width of 90 feet, with a 54-foot roadway and 18-foot sidewalks, is a satisfactory minimum for meeting the practical

requirements of an ordinary main traffic street; a width of 100 feet is preferable, and 80 feet may be regarded as a rather nig-gardly irreducible minimum.

In this connection it is interesting to note the standard widths adopted in European cities. The standard in London is 48 feet* between curbs and 80 feet between buildings for secondary avenues, and 100 feet over all for principal arteries; and 140 feet over all is proposed for two great main arteries, the cutting of which, through the midst of the city, is being considered. In German cities of the second size, such as Leipzig, Frankfort and Hanover, the standards are as follows: for strictly local streets, 33 to 47 feet; for secondary thoroughfares, 50 to 80 feet, and for main thoroughfares, 85 to 118 feet. A Prussian law, in force since 1875, and apparently drawn up to meet the requirements of Berlin with its heavier traffic, requires the following dimensions for the laying out of new streets and for the alteration of old ones: local streets, 40 to 65 feet; secondary thoroughfares, 65 to 95 feet; main thoroughfares, over 95 feet.†

Special Types of Thoroughfares The above considerations apply only to the ordinary main thoroughfares of normal character.

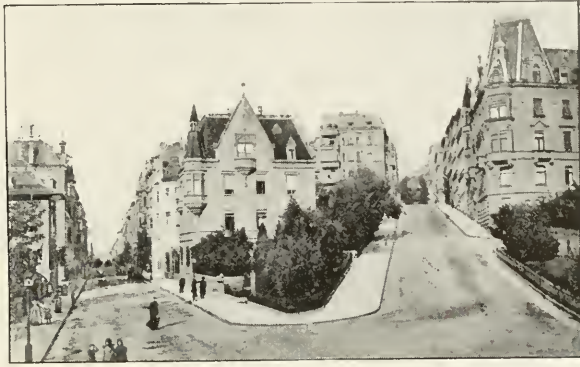
In most of the great cities of the world, there has been a considerable development of special thoroughfares of much greater width, including, for example, locations for transportation lines (surface or elevated), on separate rights of way decorated with trees; and including tree-shaded promenades and garden strips. These have usually been laid out in suburban sections before they were much built up; or, if within the built-up districts, on the sites of old fortifications, canals, or other abandoned engineering works. The latter opportunities are lacking at Pittsburgh, except in connection with the river banks. In the suburban localities of Pittsburgh, so much of the available building land is topographically divided into narrow strips that it would be cut to pieces in an exceptionally uneconomical manner by any boulevards, of the type usual in flatter cities, where a substantially uniform width of 150, or 200, or 300 feet is not infrequently carried through for considerable distances. As a general rule, any width to be

*English street cars are narrower than American cars.

†Dr. Stübgen's "Der Stadtebau," pp. 69 and 622.

secured for esthetic purposes in connection with Pittsburgh suburban thoroughfares, over and above that needed for handling the expectable future street traffic, must not be in the form of a general and continuous widening.

But occasional pieces here and there may be taken for park purposes, as, for instance, a steep sidehill adjacent to the line and unavailable or difficult for building. Or a narrow ridge, on which the thoroughfare runs, may have at some point so little available building



Park treatment of hillside street junction at Stuttgart

land fronting upon it that the whole can reasonably be parked for a short distance, thus keeping open the distant views.

There are two special forms of street, developed here and there in hilly cities all over the world, of which Pittsburgh needs to take account in its suburban development. In many instances, and for long distances, existing suburban thoroughfares that must be enlarged and improved, and others that must be laid

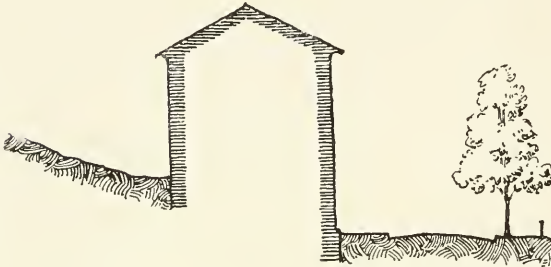


Public resting place and outlook spot on a one-sided hillside street in Heidelberg

out, are compelled to run along the face of hills so steep that a street of level cross section, even though limited to 80 feet, would leave the land on one or both sides so far above or below the grade as to destroy

its value for building purposes. In such cases it is often practicable to make use of one-sided streets or two-level streets. The former are designed to give accessible frontage on one side only,

usually the up-hill side. The property on the opposite side is reached by the next street, which is laid out correspondingly nearer in order not to make the lots too deep. The width of

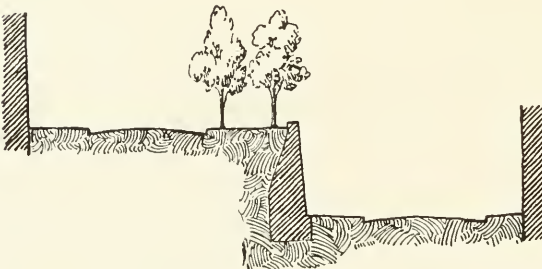


such a one-sided street may be curtailed without reducing its thoroughfare capacity because it is freed from local business

Section showing one type of hillside street

all along one side. Bluff Street, though not a thoroughfare, is an excellent Pittsburgh example of the one-sided street, and illustrates the great attractiveness which such streets often possess. In a two-level street a longitudinal bank, or retaining wall, is introduced in the middle so as to adapt it to the topography and bring each half of it nearer to the natural surface where the abutting property fronts upon it. Such a street must normally be wider than a single thoroughfare of the same capacity, the saving in construction and in the development of abutting land more than counterbalancing the cost of extra width.

Widths for outlying thoroughfares in a district like Pittsburgh, therefore, cannot be determined by any general rule. Each must be laid out as a problem by itself, the principal objects in each problem being to select a tolerably direct line on



Section of a two-level street at Zurich, Switzerland.

reasonable gradient, and so to fix the side lines of the location that it shall be possible to meet the immediate needs by constructing an economical suburban road, where it does not already exist, and ulti-

mately to convert it into an ample urban thoroughfare with the minimum of cost and inconvenience.

**Widening
Old Streets** Whatever radical changes may be made to improve the present or safeguard the future condition of the thoroughfare system in regions that are now rural, there remains a huge problem within the district where the street system has already crystallized into substantially its final form. Here increased capacity can, for the most part, be secured only by local improvements and widenings of existing thoroughfares.

Fortunately, the building up of the street frontage with solid blocks of stores, apartments, and business structures, has at most points followed rather slowly after the earlier wave of detached dwelling houses, and a large proportion of the streets which are destined to be the main arteries of the huge future city are still lined by buildings which are set back at various distances from the street, leaving front door-yards between them and the sidewalk. Outside of the down town district, and a limited area in East Liberty, it is possible, therefore, to provide for the ultimate widening of these streets without the destruction of many valuable structures, *provided the preliminary steps are promptly taken.*

As traffic increases and the lots come to be used for business purposes, such a set-back becomes inconvenient and undesirable, and one by one the buildings are either extended to the sidewalk by new additions, or new buildings are erected on the sidewalk line. The reason for this change is not usually that additional lot depth is required, for often considerable yards are left unoccupied at the rear, but is simply that on a commercial street the buildings need to be as close to the stream of traffic as possible; and since the individual lot owner cannot move the street as a whole up to his building, he has to extend or move his building to the street. His immediate purpose is thus served, and ultimately the whole row of buildings is similarly advanced in response to changed conditions. But at just about the time when this process is fully completed, the volume of traffic flowing over the street is apt to have become so great that everybody recognizes the street to be too narrow for the increased traffic it has now to carry. If the case is a bad one, the inconvenience due to overcrowding the traveled way will in time reach a point where, in spite of the great cost of such an operation, the buildings all

along one or both sides of the street have to be destroyed and a new building line established—it may be on the very line where most of the original buildings stood before increasing traffic began to offer inducements to move them forward to the sidewalk. Indeed, it may be said as a general rule that on any street where the buildings are set back from the sidewalk line the very advancement of a few buildings to the sidewalk line is a sign which points directly to the growth of travel and indicates that ample width will soon be needed in that thoroughfare.

As soon as these conditions appear, it is time to act. As already noted, it is not, in most cases, the desire to utilize a greater depth of lot which leads to the change, but the desire to get next to the sidewalk and to do away with a front yard which has served its purpose and is not wanted under the new conditions. If the street is one likely to have a considerable amount of through travel, it would be reasonable *at once* to lay it out wide enough to handle such travel; and the cost of the land taken for the widening would be charged, at least in part, to the abutters, for they get, by the change, what many of them already want and what the rest will soon be wanting—direct frontage on a busy sidewalk.

A still wiser course of procedure would be to determine on the widening of these future main thoroughfares before any buildings have been advanced to the sidewalk line, and to establish building lines far enough apart to leave room for all probable future requirements; but to make no physical widening of the street until the growth of travel—or the demands of the abutters—call for shifting the sidewalks over to the established building line and enlarging the roadway to correspond. This is the invariable practice in Washington and in most well-conducted European cities. It is the plan to some extent in New York, where just recently the sidewalks of Fifth Avenue have been moved back against the building line on the space formerly occupied by stoops, areaways, and dooryards. Pennsylvania Avenue and Sixteenth Street, in Washington, are both laid out 160 feet wide from building line to building line, although Pennsylvania avenue is an important business artery and Sixteenth Street is a residence street without heavy traffic and with no commercial business. On the former, the wide sidewalks are in immediate contact with the fronts of the buildings, as is proper for a business street, and

the roadway, with car tracks in the middle, is more than wide enough to carry all traffic that can ever be concentrated upon it. Whereas, on Sixteenth Street, the traveled portion of the street, including sidewalks and the space for sidewalk trees, is only 80 feet wide; and the remainder is occupied by front dooryards 40 feet deep, which the householders are at liberty to fence and use almost as freely as if they owned them in fee simple. At the same time all the householders are protected against the premature action of any individual lot owner who might see a possible advantage in being among the first to bid for a commercial business by building a flat-house with stores under it out upon the sidewalk line 40 feet in advance of the other houses. This is the sort of thing that is happening every now and then in Pittsburgh on streets where the great majority of the owners would prefer to have the set-back continued for some years longer. In Washington this crowding forward cannot be done; but when a reasonably large proportion of the owners on any street, or any block of a street, are ready for the change, the front yards are abolished and the sidewalk is moved over into contact with the buildings. If a single owner wants to put in a store long before his neighbors are ready to give up their front yards and long before the City is ready to widen the street to increase its traffic capacity, he is of course at liberty to do so; but he must not move forward of the general building line. What he usually does is to abolish his own front dooryard and substitute an extra wide piece of sidewalk paving in place of it, sometimes using the space for outdoor stands, or show cases, to attract trade. He may even be permitted to erect light temporary structures, such as awnings, on the space between his main building and the present sidewalk line, under which, in good weather, he can do a very good business.

There is, then, one course of action which overshadows, in permanent importance and in urgency, all other things that Pittsburgh could do at the present time for the improvement of its main thoroughfare system. That is to establish new building lines, at a suitable distance apart, along all of its present and prospective main thoroughfares which there is any prospect of being able to widen.

Pittsburgh, in common with other cities in Pennsylvania, has a remarkable power, which is of the utmost importance in connec-

tion with the intelligent control of its street development, but of which it has not hitherto taken adequate advantage; a power that appears to be denied to the cities of every other state in the Union, although effectively used in some other countries. Pittsburgh may legally lay out a street in anticipation of a future need, and yet postpone entering upon the land for construction or for opening it to the public. Until the city legally enters on the street, the owner of the land has the free use thereof, and he receives payment only when the opening takes place; but if, in the interim, he shall have erected any structure within the limits of the proposed street, he will receive no compensation therefor when the street is opened. Although similar laws have been declared unconstitutional in other states, this provision has been sustained in Pennsylvania, and the power has been effectively exercised in numberless cases since the middle of the last century.

Philadelphia has applied the same principle to street widenings, as for example in the case of Chestnut Street. The procedure is to define a building line, set back a certain distance from the street line, and to permit no new buildings to be erected in front of that line, but to pay damages only when the power to prevent the erection of a new building is actually exercised.

The Chestnut Street widening was authorized by legislation which provided merely that the street should be widened ten feet, without specifying the procedure or method of awarding damages.*

The procedure used in the widening, as above described, had apparently no other authority than the general acts under which Pittsburgh has proceeded in laying out new streets.† This application of those acts has been sustained by the courts. If it is held

*"AN ACT.—Defining the line of Chestnut Street in the City of Philadelphia. Section 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is thereby enacted by the authority of the same, That the south line of Chestnut Street, between the rivers Delaware and Schuylkill, shall be at the distance of (539) five hundred and thirty-nine feet southward of the south side of Market Street: Provided, That this act shall not interfere with any buildings now erected on the south side of Chestnut Street. Approved the twenty-eighth day of April, Anno Domini 1870.

"AN ORDINANCE.—To provide for the widening of Chestnut Street on the City Plan: Section 1. The Select and Common Council of the city of Philadelphia do ordain that the Department of Surveys be and is hereby authorized to revise the City plan so as to make Chestnut Street from the Delaware River to the Schuylkill River of the width of sixty (60) feet, widening equally on both sides from the old center line. Section 2. After confirmation and establishment of said lines it shall not be lawful for any owner or builder to erect any new building or to rebuild or alter the front of any building now erected, without making it recede so as to conform to the lines established for a width of sixty (60) feet. Approved the thirty-first day of March, A. D. 1884. SAMUEL G. KING, Mayor of Philadelphia."

†Act of December 20, 1871, Pamphlet Laws of 1872, p. 1390; and Act of May 16, 1891.

that a specific extension of the principle of the Act of 1871 to the widening of Chestnut Street was implied in the ordinance of 1874, under authority of the Act of April, 1870, and that it is not generally applicable to widenings, a general act so intending ought to be secured from the legislature.

In the Chestnut Street case existing buildings covered most of the space between the building line and the street line, and the exercise of the power, with the consequent accrument of damages, occurred in each case only when the original building was torn down by the owner and he was required to set the new building back to the new building line.

The same principle is equally applicable to those cases where the existing buildings are mostly or wholly back of the new building line; the damages becoming due in such a case only when a building permit for the erection of a new structure encroaching on the designated open space is actually withheld.

The advantages of such a method of procedure, in the case of those highways where all, or nearly all, of the buildings are now set back from the street and where a widening will ultimately be needed, are obvious and very great. In a large percentage of cases, where the street is still mainly residential, the majority of the abutters would welcome the establishment of a building line for their own protection from inconsiderate neighbors; just as the majority of people will pay higher prices for lots in a neighborhood that is protected by properly drawn restrictions for setbacks, etc., imposed by a land company. In a great many such cases abutters could be induced to waive any claims for damages on condition that the building line should be applied to the whole street. Furthermore, the actual net damages to be paid would be distributed over a long period, and a considerable proportion of them, in many cases, could properly be assessed on adjacent benefited property owners.

When the actual physical widening of the street takes place, through absorbing the restricted zones on each side of it, the damages for land taking will be comparatively small, because at that time most of the abutters will want nothing so much as that very widening, if only to bring the sidewalks in contact with the fronts of their buildings. But regardless of its clear financial advantages to the City, in reducing its total payments for street

widening and especially in distributing the burden of that cost over a long period without running up a large bonded indebtedness and interest charges, the fundamental argument for this method of procedure is that it avoids the absolute dead loss to the whole community resulting from the destruction of valuable buildings. It is not practicable to avoid this in any other way and still accomplish the result of widened thoroughfares. Theoretically, it could be done by a direct widening of all the highways in the ordinary manner, if it were to be done promptly; but there are comparatively few cases in which there would be enough immediate advantage in the increased width to make the proposition attractive; and it is obvious that any such wholesale immediate action would involve a sudden and enormous financial burden which it is utterly impracticable for the City to assume.

If, after the gradual piecemeal process of widening at moderate and distributed expense has been begun, the City thinks it would prefer to have the process over and done with promptly, it is just as able to complete the widening immediately, by wholesale condemnation, as if the gradual process had never been entered upon. If the City begins on the gradual process, it can always change to the other when it feels rich enough, or when the buildings on the old lines have become few enough; and in the meantime the erection of new and costly buildings, obstructive to the proposed widening, has been prevented at comparatively slight expense. If the City does nothing, pending such time as it can afford to make the widening at a single operation, the cost of the operation is liable to mount at least as fast as the City's ability to pay for it.

While the method proposed is peculiarly adapted to handling the problem of a thoroughfare along which the majority of the frontage is not yet occupied by buildings standing on the street line, it may be objected that it is not suitable for widening one that is built up, like Forbes Street. It is true that the patchwork appearance of such a street during the process of gradual reconstruction is somewhat unsightly,—with here and there a wide place where new buildings have gone up, and between them narrow parts, thus exposing the blank side walls of old buildings projecting beyond the new ones. Yet in cities where the sense of

civic beauty is far more acute than it generally is in America, this temporarily ragged condition is accepted as a small price to pay for the economical and certain accomplishment of a great permanent improvement.

**Unified Procedure
For City, County
and Borough**

It is obvious that the flow of traffic moves regardless of the artificial boundaries of the city and the surrounding boroughs, and that if an efficient system of thoroughfares is to be envolved for the Pittsburgh Industrial District it will be necessary to disregard those boundaries in planning it. This has been done in the preliminary studies which have resulted in this report, and the necessity for it must control the form of any permanent organization for preparing final plans and executing them. If these duties are to be entrusted to officers of the City, and the city boundaries remain unchanged, those officers must have authority from the legislature to deal with territory beyond the boundaries of the city, as is the case in a limited way in Wisconsin cities.*

The simplest and most logical procedure, if the boundaries of the city and of the boroughs are to remain substantially unchanged, would be to establish a common agency for dealing with the general problems of city planning for all of the municipalities and the related parts of the country outside of them. The Constitution of Pennsylvania apparently prevents the formation of a special metropolitan board for the Pittsburgh Industrial District, but general authority might be obtained under which the County could establish such a board. If the difficulty should be met simply by extending the boundaries of the city, it is important that the new boundaries should include not merely those areas which are now seen to have close physical relations with the city, but a great extent of territory within which the beginnings of urban or suburban growth have started, or are likely to start, during the next generation.

Whether the duty of planning and providing for the main transportation lines is made a city affair or a county affair, those who are charged with it should be free to go as far in any given direction as the demands of the traffic lead them. They should neither be limited by arbitrary boundaries in those directions where scattering but connected urban development may reach out

*Public Statutes, Sec. 2261 m.

furthest from the center, nor compelled to extend their operations to an arbitrary boundary in those directions where such development falls short.

SPECIFIC RECOMMENDATIONS

MAIN ARTERIES

As noted earlier in this report, one of the two main eastward thoroughfare routes, from the Point District, must lie along the flat land between the Allegheny River and the bluff southeast of the Pennsylvania tracks. Through this bottle-neck **Penn Avenue Artery** must pass the trunk line (or lines) of one of the largest thoroughfare systems leading from the downtown district of Pittsburgh. At the foot of the Lawrenceville hill the system branches into two main lines of extension. On the one hand are Penn and Liberty Avenues, extending, by different routes, through the Garfield, Bloomfield, Friendship and Shadyside Districts to East Liberty; and from there connecting directly to Squirrel Hill, Highland Park, Homewood, Brushton, Wilkinsburg and all points further east. On the other hand is Butler Street, following the low land along the river through Lawrenceville to Morningside and Highland Park. Via the Forty-third Street bridge, this line reaches Millvale and the country north thereof; via the Sharpsburg and Aspinwall bridges it reaches Etna, Sharpsburg, Aspinwall, and Shaler and O'Hara townships, and connects directly with the Freeport Road, the only thoroughfare leading up the Allegheny River. The trunk line of this system is composed of two narrow streets, Penn Avenue and Liberty Avenue, the one 60 and the other 50 feet in width. Even now this accommodation is inadequate, and, considering the extent of territory served and the increase of through traffic to be expected as the city grows and the outlying lands develop, a much greater capacity for general traffic through this throat will very soon be needed.

There are four different ways in which this greater capacity might be realized.

In the first place, a new street might be cut through north of Penn Avenue. Smallman Street, from Twenty-first to Thirty-sixth Street, already forms a good sized piece of such a thoroughfare. Pike Street would be its normal extension in town to Eleventh

Street, but, like Try Street near Second Avenue, it has been surrendered to the Pennsylvania Railroad for a connecting line and spur tracks. Furthermore, it is very narrow (not over 40 feet) and is difficult to widen on account of the many industrial plants abutting thereon. The connections from such a thoroughfare with Penn Avenue, Liberty Avenue and Butler Street at one end, and with the down town thoroughfares at the other, are quite indirect; and they could be improved only at great expense.

The only other place for a new thoroughfare is along Spring Alley, between Penn and Liberty Avenues. As this whole block is only 220 feet wide, including the alley, it is obvious that a broad avenue through the middle of it would leave the abutting property in very uneconomical shape.

As a modification of this plan, the widening of Spring Alley entirely on the south side was considered. As this would leave lots 40 feet or less in depth between the new street and Liberty Avenue, it would mean the practical destruction of the half-block from Spring Alley to Liberty Avenue. The remaining strip could be taken as a central parking space in a wide boulevard thoroughfare, extending from Spring Alley to the railroad; or Liberty Avenue could be abandoned, and the space, left between the new street and the railroad, could be used for warehouses or for business wanting direct railroad connections; or it might be sold in whole or in part to the Pennsylvania Railroad, for additional track space. It is obvious that each of these plans cuts up the property undesirably: the first is not only costly but is extravagantly wasteful of land in a region where available land is strictly limited and should therefore be put to its most efficient use: and the other plans both involve an entire redistribution of the land south of the new street. They could hardly be executed without powers of "excess condemnation" for which constitutional authority is lacking.

A third plan would be to widen Liberty Avenue on the north side. There is no special difficulty in the way of this scheme, and it could certainly be more easily carried out, and at less cost, than any of the Spring Alley plans. Merely as a traffic way between two points, Liberty Avenue widened would be perfectly satisfactory, but several incidental considerations must be borne in mind. First, the lots on the north side of the street

would be cut at least to 70 and probably to 50 feet, neither of which is a desirable depth for lots on a main thoroughfare; and second, the street would have business frontage on one side only. The latter is an uneconomic arrangement from the point of view both of the real estate owner and of the City, and the street would be much less agreeable than if it were separated from the railroad.

The fourth plan would be to widen Penn Avenue. This street is now 60 feet in width, and most of the lots on each side are 100 feet deep, except for several blocks on the north side where they are about 120 feet. The street is built up solidly on both sides, but scarcely any of the buildings are new or costly. The property values are almost uniformly a little higher than on Liberty Avenue. If Penn Avenue were widened 10 feet on each side, making an 80-foot thoroughfare, the abutting lots would still be 90 feet or over in depth; and if the street were made 100 feet wide, the lots would still be 80 feet deep. Though it might cost somewhat more to widen Penn Avenue than Liberty Avenue, it is evident that the abutting property would be left in far better shape, and the benefit to be had from increased frontage value would be much greater.

After due consideration of each of the above plans, bearing in mind the cost, the difficulty of carrying it out, and the value of the result, both as an important main thoroughfare artery and as a local improvement, it is recommended that Penn Avenue be widened to 100 feet. If the widening is to be accomplished by the gradual process,* that is by merely establishing the new building lines at the present time, and by paying damages only when new buildings are set back to this line, the widening should probably be made on both sides: for in this way the minimum setback will be required for individual new developments and the lots will be left of a good depth on both sides of the street. But if the widening is all to be made at once, it will be less costly to make it entirely on the south side. In either case, the lots remaining will be none too deep, and it is suggested that ultimately Spring Alley may be abandoned and the opportunity furnished for deep lots for warehouses and similar purposes, fronting on a large thoroughfare and having direct railroad connections over Liberty Avenue in the rear.

*Methods of widening are fully discussed on pages 37 to 42.

Forbes Street Artery

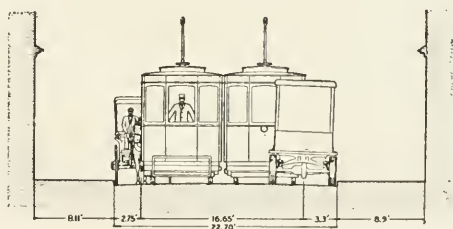
The other eastward thoroughfare system lies south of the Hill District. From Soho eastward there are two main branches to the system: on the one hand are Forbes Street and Fifth Avenue, leading through Oakland to Bellefield, Shadyside, East Liberty, Squirrel Hill, and all points east; on the other hand is a possible and much-needed thoroughfare reaching Greenfield, Hazelwood, Glenwood, and Hays, and from there, by branches and extensions, connecting to Homestead, Duquesne, McKeesport, and points up the Monongahela and Youghiogheny Rivers, as well as to the country south in Baldwin, Mifflin, Snowden, and Jefferson townships.

At present the trunk-line of this system (from the Point District past Soho hill) is composed of three narrow streets, Second Avenue, Forbes Street, and Fifth Avenue, which all together are no more than adequate to accommodate the present surface travel. Future developments in the East End, up the Monongahela, and in the country south of Homestead, and improved thoroughfare connections with the two latter regions, will undoubtedly increase the through traffic on these streets to such an extent that their capacity will soon be taxed beyond its limit. There can be no doubt that more accommodations will be needed in the near future.

At first thought it was hoped that Second Avenue might be improved to accommodate a reasonable increase in east and west traffic; but the Baltimore & Ohio Railroad on one side, and several large industrial plants on the other, present serious obstacles to widening it. A plan to exchange locations with the railroad was considered, but it did not appear to offer sufficient advantage to the railroad to tempt them to coöperate in the matter.

Incidentally, Second Avenue can and should be widened to 80 feet, from Ross Street to the Tenth Street bridge, thus making a good connection between the Point District and the South Side.

It remained then to secure the desired street capacity, in some



Section of Second Avenue between Try Street and Tenth Street Bridge

way, through the valley now occupied by Forbes Street and Fifth Avenue. To avoid the higher land values on these streets, various schemes were tried to get a third thoroughfare in this valley, first on the south and then on the north side, but without success. The indirectness of line and the seriousness of grade difficulties, coupled with cost of cutting new connections at either end, more than outweighed the advantages offered by the cheaper land.

One proposition, however, is worthy of special remark. That was to cut a new street from Fifth Avenue, near Sixth Avenue, to the end of Colwell Street, widen the latter, carry it over the Moultrie Street valley on a high viaduct, skirt around Soho hill, partly above and partly below Beelen Street, and either join Fifth Avenue at Robinson Street, or, going over this street, follow along the hillside and meet the southerly end of Bayard Street. The cost of constructing this line, the complication of grades with cross-streets (owing to the width of the new street), and the difficulty of getting good connections with any thoroughfares leading up the Monongahela, practically put it out of the question as a solution of the main problem in hand. But it offers many advantages as a specialized thoroughfare for fast-moving automobiles for the East End. It is well up on the hill, furnishing, at times, fine outlooks over the river; the gradient need nowhere be over 4 per cent, and the line could be easily laid out so as to have very few grade crossings with other important streets. It is urged that this route be borne in mind when the demand is felt for another "Grant Boulevard," south of the Hill.

It remained, then, to consider adequate widenings of Fifth Avenue or Forbes Street. The former is now 60 feet wide throughout; it is by far the more important thoroughfare at present, land values are much higher than on Forbes Street, and new and somewhat costly buildings are already crowding out the cheap houses of an older generation. Forbes Street is also 60 feet in width, except near its westerly end where it is only 50 feet, but the buildings, on the whole, are much less valuable than those on Fifth Avenue. Lot depths are practically the same, and so are the street gradients. It is evident, therefore, that the widening of Forbes Street should be a far less costly undertaking than the widening of Fifth Avenue.

A thorough study of the possible eastward extensions of Forbes Street has developed no obstacles to using it as the principal thoroughfare. By referring to "Outlying Thoroughfare Improvements" below (Sections 11, 14, 15, 16, 17 and 19), it will be seen that a cross connection can easily be secured at Brady Street to Fifth Avenue—the latter being the easier street to widen beyond this point, as well as offering somewhat better gradients. It will also be seen that the thoroughfare extension to Greenfield, Hazelwood, Glenwood, and eastward, can branch from Forbes Street (just east of Brady) more easily and cheaply than it could from Fifth Avenue. Forbes Street, moreover, enters the down town district at a slightly more central, and, considering the proposed improvements in the down town district, a more advantageous point.

It is recommended, therefore, that Forbes Street be made the main artery of this eastbound thoroughfare system, and that it be widened to 100 feet. As in the case of Penn Avenue, the widening should be made on both sides if done by the gradual process; but if done all at one time, it should be made entirely on the south side.

South Hills Artery Between the Point District and the South Hills there is now urgent need for a thoroughfare connection of adequate capacity and on reasonable gradients. At present the only access for surface traffic—except electric cars—is via the Brownsville Road, or South Eighteenth Street, or the inclines. The two roads are steep, from 7 to 8 per cent, and the inclines are expensive and of very limited capacity. The South Hills country is sparsely developed as yet, but, being comparatively free from smoke and very near to the business district, it offers unusually desirable opportunities for homes, and it must soon be thickly settled. The need for a good thoroughfare to this region will then be of far greater importance even than now.

Only two reasonable ways of securing such a thoroughfare appear. One is by a new slanting road up the hillside south of the river, much longer, and so on an easier gradient, than Brownsville Road; the other is by some high-level bridge and tunnel scheme, such as that proposed by residents of the South Hills.

The opportunities for a hillside road have been studied with some care, but the excessive length required to get a reasonable

gradient, and the difficulties and high cost of constructing a wide thoroughfare on the steep hillside, have proved to be serious drawbacks to all possible plans for such a street.

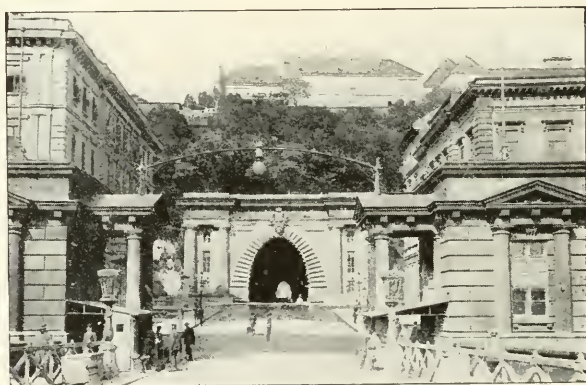


Entrance to a thoroughfare tunnel, Stuttgart

building space is at a much higher premium than it is now, the overwhelming majority of the population will be found on the hills rather than in the narrow valleys.

There are certain general tendencies which are observable, both in America and in Europe, in cities which have a large area of hill-top land separated by deep valleys. The hills are generally preferred for residential purposes, and the earliest roads or trails often follow the ridges, plunging down and climbing up again steeply to get from one ridge to another. The main roads in the second stage of development are apt to seek the valleys for the sake of good gradients, with a corresponding development of the most active urban growth in the valleys and on the lower slopes; the hilltop development being retarded by lack of transportation facilities. Nevertheless the continued

In any thoroughfare scheme to the South Hills, it is reasonably clear that the end to be attained is the *most direct* access possible on *easy gradients* to the *higher levels* of the South Hills country. For it is on the upper levels, the hill-tops and the upper slopes, that most of the present development has taken place; and there can be little doubt that in the future, even when



Thoroughfare tunnel at Budapest

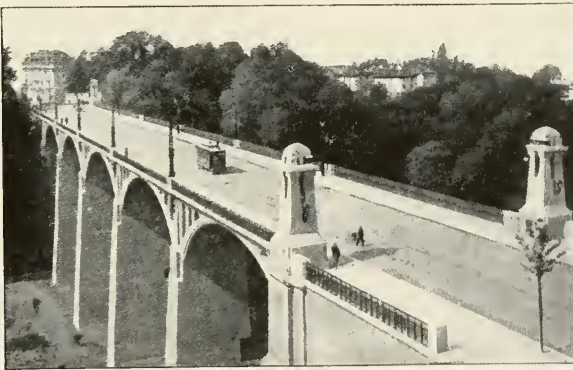
attractiveness of the uplands slowly builds them up, and as the wealth of the community grows there is an inevitable tendency to reduce the obstacles to ready connection between one hill district and another by raising the levels of the bridges which cross the intervening valleys. Bolder and bolder viaducts are built, until finally there is a complete and more or less independent highway system on the upper levels, and the major part of the residential district comes to be there too.



Panther Hollow bridge—a good-looking viaduct in Pittsburgh

Obviously, therefore, every opportunity should be utilized to gain grade, in the approach to the South Hills District, by starting at a high elevation and wasting no distance in level stretches, if the most efficient thoroughfare artery to this district is to be secured.

The bridge and tunnel plan, proposed by residents of the South Hills, is briefly as follows: to start from Forbes Street, at Sixth Avenue, and rise steadily to the bluff north of Second Avenue; from here to rise on a bridge over the river, at a uniform gradient,



A viaduct in Lausanne, showing how the valleys are spanned by the main traffic ways

to the opposite hill; to pierce the hill by a tunnel, at the same gradient, and reach the level of the present highways at the junction of Washington Avenue and Haberman Street. It is proposed also to have a lower deck on the bridge,

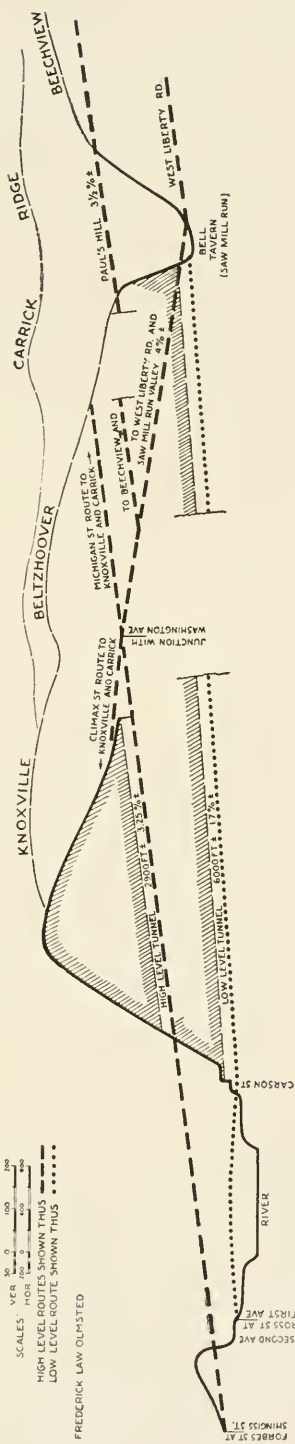
which would connect East Carson Street with Second Avenue and an extension of Sixth Avenue.

This plan has the obvious advantage of starting some 40 feet higher than any of the present bridge approaches in the down town district, and at a point from 500 to 1000 feet north of any other feasible point of departure. Considerable gain is thus made at the very start. A uniform, uninterrupted gradient is proposed, from Forbes Street to Washington Avenue, in order to climb the maximum amount possible with a given distance and gradient. Information furnished us through the office of Edwin K. Morse shows that the horizontal distance from Forbes Street to Washington Avenue is 6800 feet and the difference in elevation between the two points is 260 feet. It follows that a uniform gradient, from one end to the other would be 3.82 per cent; this could be reduced to 3.74 per cent by raising the grade of Forbes Street about 6 feet, a change which is to be desired in connection with the down town thoroughfare improvements and the Civic Center. At first sight this gradient seems good for Pittsburgh; but bearing in mind the distance—over a mile and a quarter—for which this gradient is maintained without a break, considerable hesitancy is felt about recommending it for the main artery of a large thoroughfare system. A gradient of 3.5 per cent should probably be considered a maximum for such a long climb on a main thoroughfare, and 3 per cent would be far better. The former gradient could be secured by dropping the southern end of the tunnel about 16 feet, the latter by dropping it about 50 feet. In either case, the southern end of the tunnel, or its approach, would be bent westward and extended a little down the valley, north of Washington Avenue, toward the mouth of the street car tunnel. The exact amount of reduction to be desired in the tunnel gradient must be finally determined in conjunction with a careful study of its southerly extensions based on complete and accurate surveys of the possible routes. There is no advantage in lengthening one portion of a thoroughfare to get a 3 per cent gradient if nothing better than 3.5 or 4 per cent can be secured on the rest of the route. The surveys made for the County Commissioners, under the direction of E. M. Bigelow, and courteously shown to representatives of the Civic Commission, unfortunately fail to furnish the needful data, as they do not extend to the upland

PITTSBURGH CIVIC COMMISSION
 ROUGH PROFILES OF SOUTH HILLS
 TUNNEL AND THOROUGHFARE ROUTES

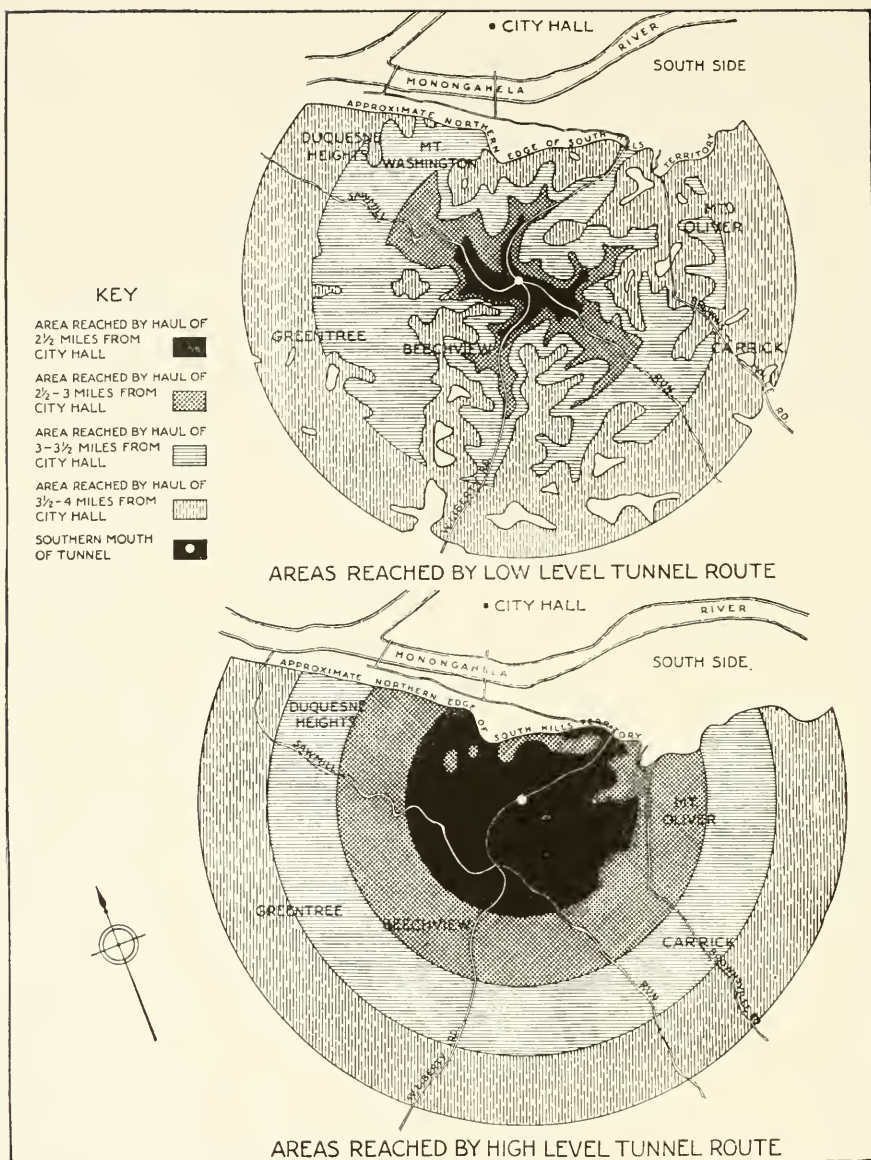
SCALES: HORIZONTAL 1" = 100' VERTICAL 1" = 100'
 HIGH LEVEL ROUTES SHOWN THUS: - - - - -
 LOW LEVEL ROUTE SHOWN THUS: ·····

FREDERICK LAW OLNSTED



The high-level tunnel reaches existing streets at Washington Avenue. From this point is planned a system of thoroughfares, which, if constructed, would reach all parts of the South Hills. These thoroughfares are indicated by dashes beyond the junction of the tunnel with Washington Avenue.

The Bell House, or low-level tunnel is indicated by a dotted line. It is an approach to the West Liberty Road and would give easy access only to the territory reached by that road and to other territory in the nearby valley bottoms.



The above diagrams show the areas that can be reached via the low-level and high-level tunnel routes to the South Hills, on a maximum gradient of $3\frac{1}{2}$ per cent, by hauls of various lengths from City Hall. The areas are given in the following table :

Length of haul from City Hall	Total area reached		Amount of land sloping over 25 per cent		Remaining land available for use	
	Low-level route	High-level route	Low-level route	High-level route	Low-level route	High-level route
2½ miles . . .	156 acres	1091 acres	86 acres	373 acres	70 acres	718 acres
3 miles . . .	672 "	2710 "	293 "	848 "	379 "	1862 "
3½ miles . . .	2763 "	4877 "	1053 "	1617 "	1710 "	3260 "
4 miles . . .	6329 "	7408 "	1935 "	2449 "	4394 "	4959 "

districts which are the ultimate objective of the proposed route.

But even without precise data, it is clear that the best permanent means of reaching those upland districts, whether on one side of Sawmill Run or on the other, is not by a tunnel debouching in the bottom of the valley—say at the Bell Tavern. This follows from the fact that the tunnel *can* reach a much higher level at a good gradient and with a shorter distance. And from this higher outlet point a viaduct high in the air above the Bell Tavern would give direct access to the uplands of Beechview and Mt. Lebanon and southward, while streets of easy gradient would reach the uplands east of Sawmill Run. The high level tunnel, furthermore, will reach all the areas served by the low level, or Bell Tavern, route, and in addition can reach the other and more important lands on the hills which *cannot* be reached via the Bell Tavern route within a reasonable distance.

The thoroughfare extensions from the southern end of the tunnel are briefly discussed under "Outlying Thoroughfare Improvements" below. At its northern end the new bridge would fit admirably into the proposed thoroughfare system of the Down Town District, main wide streets extending directly from the end of the bridge approach to the north, south, east, and west.

Owing to the importance of the South Side as a point for the delivery of freight, a reasonably direct and easy approach from there to the new tunnel seems desirable. Freight to be teamed to the South Hills District seems likely to originate either near the Smithfield Street bridge, or east of South Seventeenth Street. From the former point, it is almost out of the question to get an approach of easy gradient to the mouth of the tunnel, on account of the lack of distance; but it must be remembered that the inclines will still be available, greatly relieved by the new tunnel from their present congestion, and further that freight for the South Hills could easily be shipped to points from which access to the new tunnel would be easy and direct. From the latter point, the connection can be secured by climbing over the railroad on a viaduct, probably along South Twelfth Street, and thence following the hillside westward on a more or less uniform gradient to the mouth of the tunnel. An examination of the hillside below the Brownsville Road indicates that such a

street, though somewhat costly, is not in the least impracticable. It might be best to construct it with a minimum of cutting by the use of a side-hill viaduct of reinforced concrete.

With the modifications above suggested the plan proposed by the residents of the South Hills, for a bridge and tunnel to the South Hills District, is eminently desirable. It is, therefore, urgently recommended as the best method of securing an adequate main thoroughfare artery to this region.

OUTLYING THOROUGHFARE IMPROVEMENTS

The following recommendations are in no sense the result of an exhaustive study of the main thoroughfare system of the Pittsburgh District. They comprise only the most desirable improvements noted during a general study of the outlying branches and connections of those thoroughfares which concentrate upon the down town district. The fact that a study undertaken with such a point of view has led so far afield that it has compelled the investigation of existing and probable connections so remote as some of those noted below, is, in itself, evidence of the complexity of the highway problem, and of the fact that it cannot be dealt with locally, in a piecemeal manner, without great sacrifice of opportunity.

The improvements are designated in the following text by numbers which correspond with those on the accompanying folded map of the Pittsburgh District.*

1. *Sixteenth Street Bridge*.—The first thoroughfare branch of the Penn Avenue artery is the Sixteenth Street bridge. Because of its physical unfitness, and because it is, at present, an unreasonable interference to navigation, it must soon be rebuilt.†

At the time of reconstruction, the railroad grade crossing on each approach should be eliminated, probably by carrying the street over the tracks. At the southern end, the grades make such a change very simple. At the northern end, the separation of grades will be facilitated if the tracks of the Pittsburgh and Western Division of the Pennsylvania Railroad can be lowered a few feet. No physical objection to such a change of track grade is apparent.

* Map at the end of Part II.

† See Part V, Special Report on the Allegheny River Bridges.

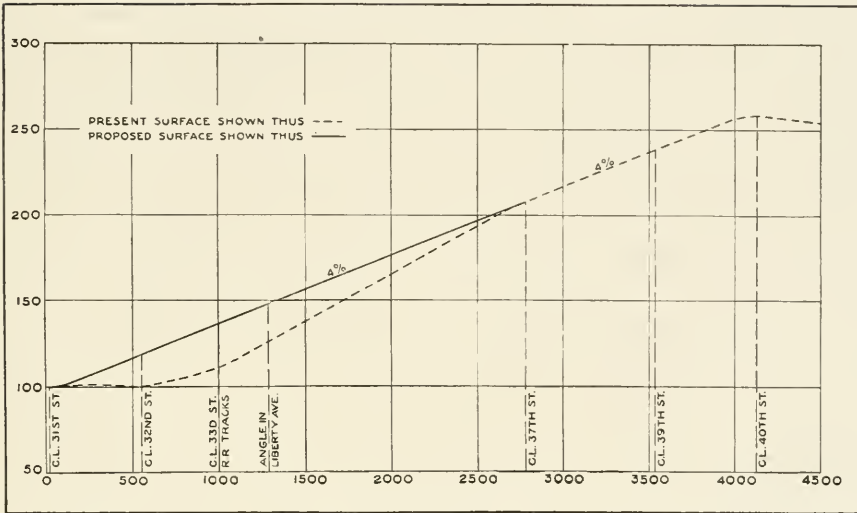


Diagram No. 1. Thirty-third Street improvement. Profile of Liberty Avenue

2. *Twenty-eighth Street Grade Crossings.*—Near Twenty-eighth Street the tracks of the Allegheny Valley Railroad cross both Liberty and Penn Avenues at grade. These grade crossings should be eliminated, the railroad tracks being raised to go over both streets.

3. *Thirty-third Street Improvement.*—At Thirty-third Street on Liberty Avenue there is a railroad grade crossing. The street should be lifted over the tracks and the filling extended west to Thirty-first Street and east to Thirty-seventh Street; in this way the gradient of the steep portion of the Lawrenceville hill can be reduced from 5.6 per cent to 4 per cent, which is the present gradient on the rest of the hill. (Diagram No. 1.) An easy connection should be made with the Penn Avenue artery at about Thirty-first Street. (Diagram No. 2.) With these changes the Penn-Liberty line would provide a thoroughfare from the down town district to the East End with a 4 per cent maximum gradient, which is easier than

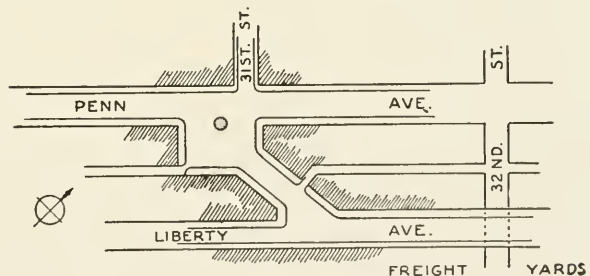


Diagram No. 2. Penn-Liberty connection at Thirty-first Street

can be reasonably obtained on any other line. The northern end of the Thirty-third Street bridge and the west end of Ligonier Streets should be raised to meet the new grade of Liberty Avenue; the bridge will then be about level, and Ligonier Street will slope between 6 and 7 per cent down to Thirty-fourth Street.

4. *Sassafras Street Outlet*.—Raising the grade on Liberty Avenue will seriously interfere with the western outlet of Sassafras Street.

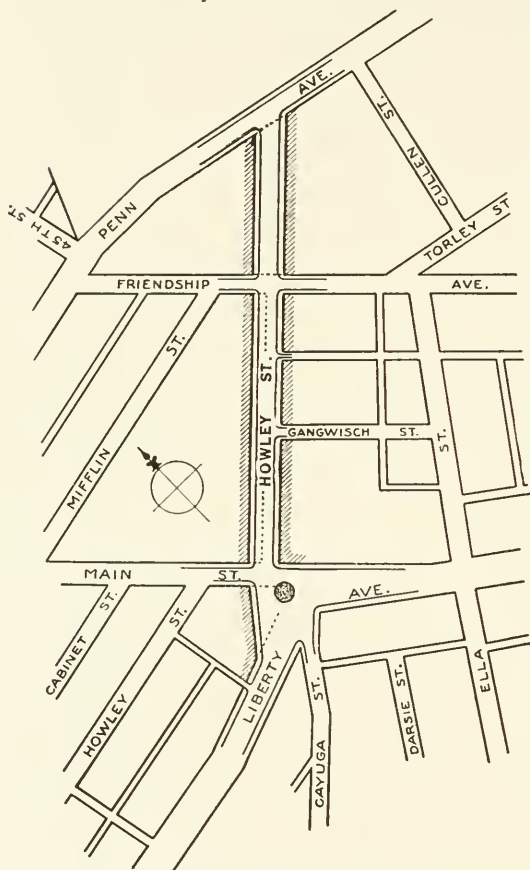


Diagram No. 3. Penn-Liberty connection at Howley Street

But if this street becomes of sufficient importance—and its location in the valley close to the railroads suggests a considerable development of its frontage for freight houses, warehouses or manufacturing—it will be simple and satisfactory to bring the western outlet to the junction of Penn Avenue and Butler Street by means of a short tunnel under Thirty-fourth Street from the south side of Liberty Avenue to the northwest side of Ligonier Street.

5. *Penn-Liberty Connection at Howley Street*.—A connection northeast from the junction of Liberty Avenue and Main Street to Penn Avenue will be needed. (Diagram No. 3). This can be secured by widening and extending Howley Street. Thereby traffic bound for the Garfield

District and east thereof can climb the Lawrenceville hill by the comparatively easy gradient (4 per cent) on Liberty Avenue, avoiding the steeper hill (about 5 per cent) on Penn avenue. This will also connect with the proposed Bloomfield bridge to Grant Boulevard.

6. *Forty-third Street Bridge*.—Butler Street is the main extension of the Penn Avenue artery up the Allegheny River, and its first branch thoroughfare is at Forty-third Street. The Forty-third Street bridge, like the one at Sixteenth Street, must soon be rebuilt.* This bridge connects Millvale and large sections of Shaler and Ross townships with the Point District via the Penn Avenue artery. The new bridge should be of ample width and should be high enough so that the approaches can be carried over the railroad tracks at either end.

7. *Sharpsburg Bridge*.—The Sharpsburg bridge is the next important branch of the Butler Street thoroughfare. It forms the most direct connection from Pittsburgh proper to the boroughs of Sharpsburg and Etna and to large portions of Shaler and O'Hara townships. The bridge should be widened—the present roadway being only 21 feet including car tracks—and the northern approaches should be improved. (Sections 60 and 61 following.)

8. *Butler Street Improvement*.—From a point nearly opposite the western end of Baker Street east to Hights Run, there is no property of value for manufacturing, or for dwellings, or stores, between Butler Street and the railroad which runs below it on the river bank. The same is true east of Hights Run as far as the Brilliant pumping station or the present beginning of Beechwood Boulevard. It seems very desirable that these portions of Butler Street, instead of being widened merely enough for traffic accommodation, be developed as a picturesque riverside parkway—a fitting approach to Highland Park and a continuation of Beechwood Boulevard. This involves the control of the narrow strip of property between Butler Street and the railroad; though occasional houses might be allowed to remain therein without detriment to the effect as a whole. The Bureau of Parks is working along these general lines, and has already bought many parcels of the land north of Highland Park between Butler Street and the railroad.

9. *Hights Run Bridge*.—The present Butler Street bridge over Hights Run is of light construction and has a total width of only 17 feet; this should be rebuilt of ample strength and capacity.

10. *The Aspinwall Bridge*.—The Aspinwall bridge, crossing

* See Part V, Special Report on the Allegheny River Bridges.

the river at Six Mile Island from Butler Street to the eastern portion of Sharpsburg, is narrow (36 feet over all) and is of light construction. It is so important that it will some day need to be rebuilt of ample width and strength for main thoroughfare use. At its southern end it connects (1) with the Butler Street thoroughfare, of which it forms the northeastern extension, and (2) with a proposed cross-town line (Section 25 following) up the Hights Run Valley to East Liberty. On the north it connects directly with Guyasuta and Aspinwall, with most of the country in O'Hara township, and with the Freeport Road leading to

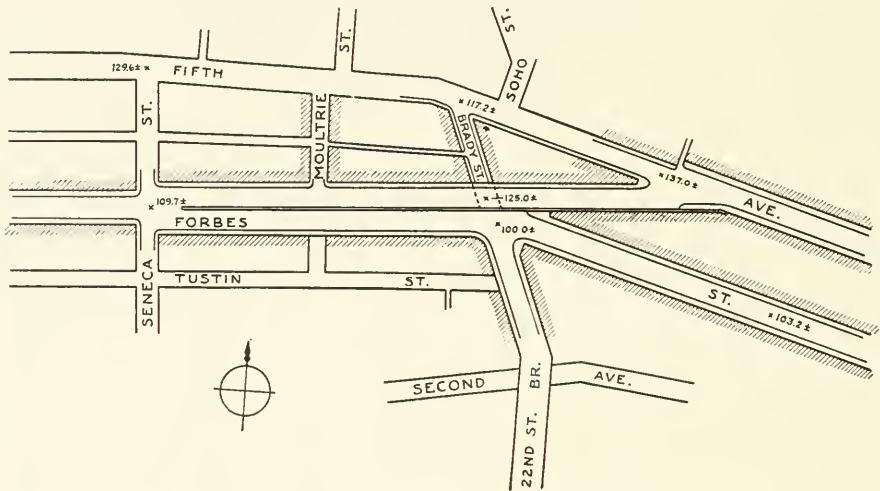


Diagram No. 4. Forbes Street—Fifth Avenue connection at Soho

Claremont, Montrose, Oakmont and all points up the Allegheny River. This Freeport Road is destined to become *the* main thoroughfare up the Allegheny because the precipitous character of the south bank of the river, and the consequent almost total absence of land suited to residential or commercial development between Highland Park and Verona, make the direct extension of Butler Street, as a riverside thoroughfare, both expensive and impracticable.

11. *Forbes Street—Fifth Avenue Connection at Soho.*—At Soho the connection between the Forbes Street artery and Fifth Avenue—the principal thoroughfare to Bellefield and all points to the east thereof—is most simply accomplished by splitting the Forbes Street artery at Seneca Street into two levels, the upper, on the

north side, running on nearly a straight line and gradient to Fifth Avenue, joining it just west of the school house. (Diagram No. 4.) The lower portion would become the continuation of Forbes Street, and should be raised at Brady Street about 17 feet, or so much that the gradient on Brady Street, up from Forbes Street under the proposed high-level street to Fifth Avenue, will not be over 6 or 7 per cent. A good gradient will still be possible on the approach from Forbes Street to the Twenty-second Street bridge; and the Forbes Street gradient, down from Seneca Street, will be much reduced. These changes will greatly improve the means of access to the Twenty-second Street bridge.

On Forbes Street, just west of Craft Avenue, there is a bad gradient for a main thoroughfare (about $6\frac{1}{2}$ per cent) which is not easy to improve; but the above cross connection at Brady Street will give a through line to the East End via the Forbes Street artery and Fifth Avenue, with a maximum gradient of about $4\frac{1}{2}$ per cent (on the Soho hill).

12. *Fifth Avenue—Center Avenue Connection at Soho.*—As a main thoroughfare feeding Minersville and the northern part of the Hill District, either from the South Side via the Twenty-second Street bridge, or from the Point District via Fifth Avenue or Forbes Street, a connection is needed on a reasonable gradient from Fifth Avenue to Center Avenue through the valley south of Soho hill. Such a street (Diagram No. 5) could leave Fifth Avenue at Jumonville Street, start along the location of Wyandotte Street, then curve

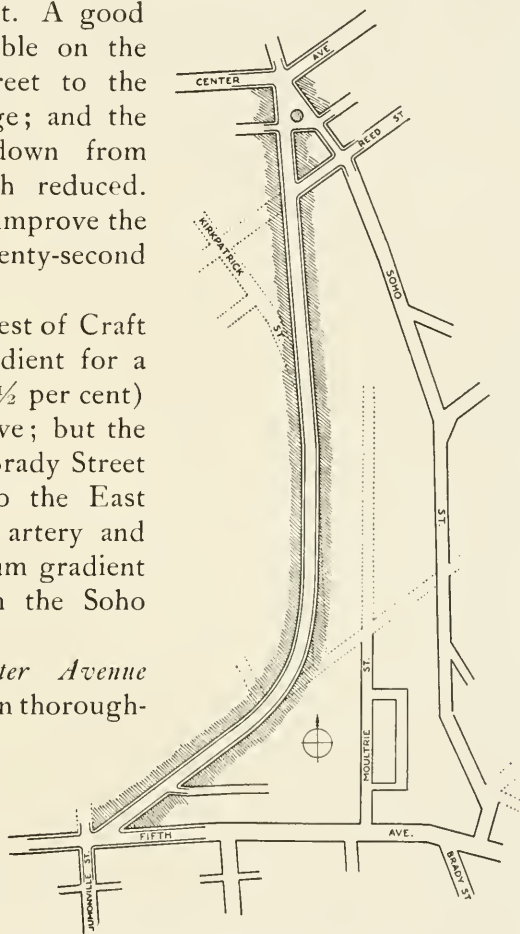


Diagram No. 5. Fifth Avenue—Center Avenue connection at Soho

around the nose of the hill and follow the hillside on the west of the valley; thus, by cutting away some of the recent filling at the upper end of the valley, it could reach Center Avenue at the corner of Soho Street

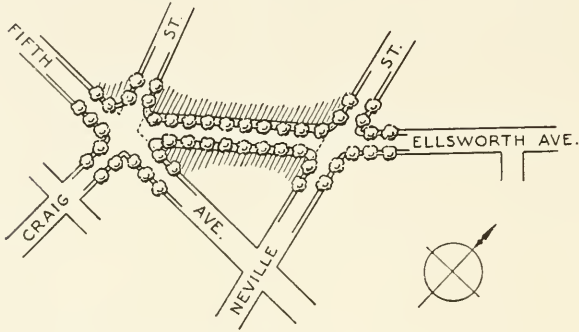


Diagram No. 6. Ellsworth Avenue extension

with a uniform gradient of about 3 per cent. At present there is no way of reaching this high land on a gradient less than 7 per cent.

The new street shown on the diagram is preferred to the improvement and extension of Moultrie Street because (1) it gives a better gradient, (2) it is a more direct approach from the down town district, and (3) it leaves the bottom of the valley available for enlarging the Moultrie Street playground.*

13. *Ellsworth Avenue Extension.*—As Fifth Avenue is the principal thoroughfare to Bellefield, so Ellsworth Avenue becomes its main branch or extension from Bellefield to East Liberty. This street should not end at Neville Street, as at present, but should be extended to the corner of Craig Street and Fifth Avenue. (Diagram No. 6.)



A one-sided hill-street in Geneva, possessing an incidental recreative value

14. *Monongahela Hillside Thoroughfare.*—The thoroughfare requirements from the Forbes Street artery up the Monongahela River can best be met by a hillside street, partly new and partly following existing streets, running substantially parallel to Second

* See Part IV Section 1, page 117.

Avenue but along the hillside above the railroad tracks. This thoroughfare would leave Forbes Street at the bend about 1200 feet east of Brady Street, cross the little valley (which should be filled north of the new street) and extend eastward, crossing Bates Run on a viaduct, and using, where possible, parts of Lawn and Frazier Streets, to the mouth of Four Mile Run. Thence, by another viaduct, it would connect with Sylvan Avenue, on the north side of the valley, and follow this street widened to Hazelwood Avenue; by another viaduct it would cross the Flowers Avenue valley to Glenwood Avenue and follow the latter widened and partially regraded to Mansion Street. There it would bend to the northeast, cut through the plateau land to the next ravine, cross this on a viaduct and, bending southward again, descend around the nose of the hill to the Glenwood bridge. So easy a gradient can be obtained on this new street that it may reasonably be expected to carry nearly all

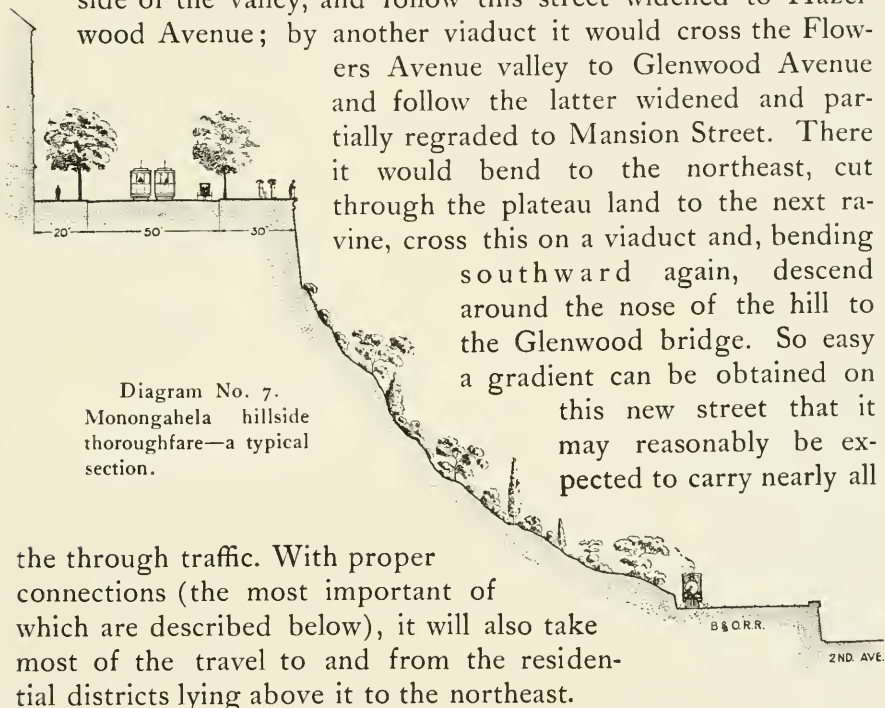


Diagram No. 7.
Monongahela hillside
thoroughfare—a typical
section.

the through traffic. With proper connections (the most important of which are described below), it will also take most of the travel to and from the residential districts lying above it to the northeast.

The location of this street, high on the hillside above the Monongahela River, presents unusual opportunities incidental to serving its primary purpose as a main thoroughfare. With an ample roadway for all kinds of traffic, with trees for shade and decoration, with a broad promenade overlooking the river and the hills to the south, it would furnish rare and much-needed facilities for recreation; and, further, it would have a distinctive character most appropriate to the rugged topography of the Pittsburgh District. (Diagram No. 7.)

15. *Bates Run Connection.*—Starting from the western end of this new street, the first important transverse street connection

would be at Bates Run. Here a street should be run up the east side of the valley, not far from the present location of Romeo Street, to the intersection of Wilmot and Bates Streets, thus reaching the Oakland District.

16. *Greenfield Avenue Connection*.—On the southeast side of Four Mile Run the new thoroughfare will pass over Greenfield Avenue. But a connection should be made therewith by running a practically level street, from about the junction point of Sylvan Avenue and the new thoroughfare, northeast along the hillside adjacent to Greenfield Avenue until it meets the Greenfield Avenue grade.

17. *Greenfield and Squirrel Hill Extension*.—From this point on Greenfield Avenue a new street should be built running to the northeast. It would cross the first little ravine on a viaduct, thence follow the south bank of the Four Mile Run valley, climbing at a uniform gradient, and join Beechwood Boulevard at the southern end of the bridge into Schenley Park. This will furnish a direct connection from the new hillside thoroughfare to the eastern portion of the Greenfield District and to Squirrel Hill; the maximum gradient will be only about $3\frac{1}{2}$ per cent instead of about 7 per cent as at present on Greenfield Avenue.

This new street could be extended, from the point where it joins the boulevard, underneath the Greenfield Avenue viaduct, along the side of the valley to the south and up to the higher portions of the Greenfield District. The gradient of such a street need not exceed 5 per cent.

18. *Hazelwood Grade Crossing*.—Although the construction of the hillside thoroughfare (Section 14 above) does away with the necessity for widening Second Avenue east of the Tenth Street bridge, Second Avenue is still an important main line, and all feasible improvements should be made thereon. One of these is the elimination of the grade crossing at Hazelwood, and here Second Avenue should probably be carried under the tracks.

19. *Glenwood Bridge*.—The Glenwood bridge becomes a most important link in the thoroughfare system; it connects Second Avenue and the proposed hillside line at one end, with Eighth Avenue in West Homestead and with the mouth of Streets Run at the other. Eighth Avenue leads up the Monongahela to Homestead, Munhall, Rankin, Braddock, Bessemer, Duquesne and

McKeesport; Streets Run is the starting point of several important thoroughfare lines into the country south and east. One of these thoroughfares will undoubtedly be a main line from the city proper to Dravosburg and points above on the Monongahela River. The bridge should certainly be widened and the gradients of the approaches improved, especially that from Second Avenue.

20. *Baum Street Improvement.*—Grant Boulevard will always be an important line to the East End, especially for fast-moving travel. To improve its outlet eastward from Herron Hill, Baum Street and South Atlantic Avenue should be connected and extended west to Craig Street. The connection between the two streets is easily made by cutting through the corner between Liberty Avenue and Rebecca Street, leaving a small triangular park. The extension of South Atlantic Avenue will require a bridge over the Pennsylvania Railroad just east of Morewood Avenue, a bridge over the Baltimore & Ohio tracks, and the grading and paving of the street already located west to Melwood Avenue and Craig Street.*

At its eastern end the outlet into Penn Avenue should be improved by widening Whitfield Street on the east side and by rounding back the corner of Baum Street and South Highland Avenue.

21. *Center Avenue Improvement.*—The junction of Center, Ellsworth and South Highland Avenues at East Liberty is certain to become a congested point and to require more ample outlet into Penn Avenue. Several possible solutions have been considered, but the simplest plan, and probably in the end the most economical and satisfactory, is to widen Center Avenue on the south side from South Highland Avenue to Penn Avenue, cutting off the jog at the latter end. This improvement will give ample connection with Penn Avenue and the more important streets radiating from East Liberty. (Diagram No. 9.)

22. *Hamilton Avenue Extension.*—The proposed extension of Hamilton Avenue from Fifth Avenue west to Penn Avenue is certainly desirable. The western end, however, should not be located adjacent to the Pennsylvania Railroad tracks (as planned by the Bureau of Surveys) but should join Frankstown Avenue at Station Street. (Diagram No. 9.) This location provides a more

* This improvement is provided for in the current bond issue.

economical arrangement of streets and lots because it avoids (1) constructing a main thoroughfare with business frontage on only one side, and (2) leaving a building block only 100 feet in total depth between two main streets. The plan necessitates widening Frankstown Avenue, but this street is an important thoroughfare much in need of widening on its own account and a few additional feet to accommodate Hamilton Avenue traffic will not materially affect the cost.

At its eastern end the Hamilton Avenue extension should connect more directly with Kelly Street. This connection can be secured by widening and constructing Kelly Street, as located, from Fifth Avenue to Julius Street, and from there building a short diagonal to Hamilton Avenue. (Diagram No. 8.)

23. *Negley Run Boulevard*.—East Liberty is so important a junction point of main thoroughfares, a distributing point as it were, that good connections to all localities are important. One of these is a boulevard, or street, chiefly for pleasure vehicles, down Negley Run to Beechwood Boulevard. It could practically follow the lines of Princeton Place and Butler Street. By widening and

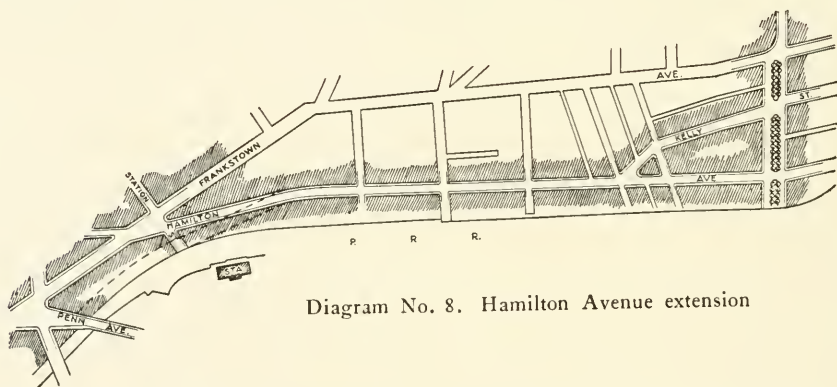


Diagram No. 8. Hamilton Avenue extension

reggrading these streets and by acquiring and controlling the ravine and its banks a very attractive boulevard may easily be secured. Incidentally an extremely unattractive and undesirable negro and Italian settlement, in this valley, will be cleared out.

24. *Larimer Avenue Extension*.—Princeton Place, or the boulevard just proposed, and Larimer Avenue, a thoroughfare leading into the Lincoln District, both dead-end at Broad Street. A connection for both should be made through to Penn Avenue. (Diagram No. 9.)

When this change is made and Frankstown Avenue is widened (Section 22) the eastern corner of Frankstown and Penn Avenue should be cut back to aid general traffic circulation.

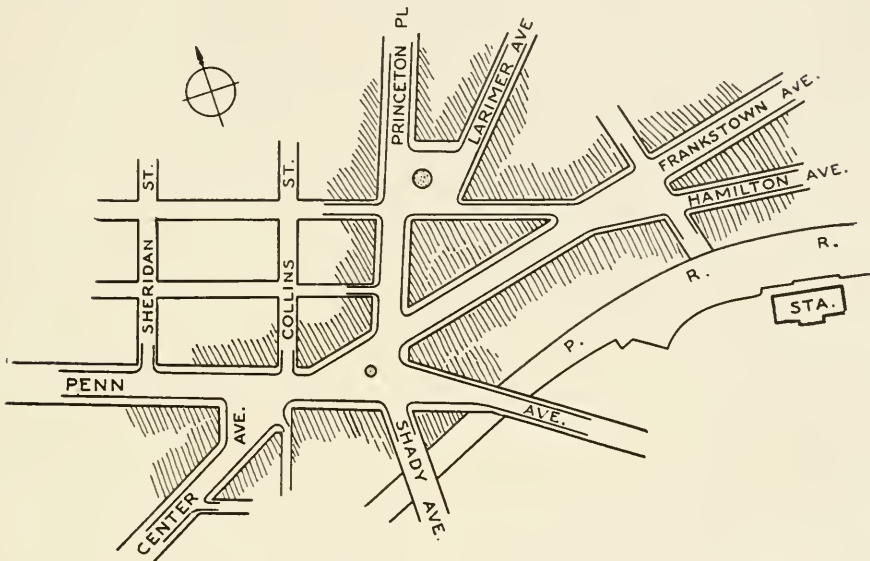


Diagram No. 9. East Liberty Improvement

25. *Hights Run Thoroughfare.*—Another connection to be desired is from the East Liberty center to the Aspinwall bridge. The needed link is from Stanton Avenue to Butler Street. Following Hights Avenue for two blocks the new street should extend down the west bank of the Hights Run valley, with a maximum gradient of about $3\frac{1}{2}$ per cent, to Butler Street. This new street would be used for both business and pleasure traffic, and its location on the steep side of a beautiful valley, much of which is already park land, will greatly enhance its value as a pleasure drive.* West frontage on this street, where the bank is not too high for use, will have a peculiar value for residential purposes owing to the permanence and beauty of an unobstructed outlook toward the park.

A branch connection might easily be secured (at a somewhat steeper gradient) between this new street and the table land of the Morningside District by winding up the side of the branch

*See Part IV, Section 15, page 121.

valley and joining Chislett Street four or five hundred feet south of Martha Street.

26. *Meadow Street Connections.*—Stanton Avenue is already an important thoroughfare feeding the high sections of Morningside and cross-connecting many radial streets especially in the Highland Park District. Meadow Street is its logical extension to the southeast, and by an approach from Stanton Avenue to the new Meadow Street bridge over Negley Run these two streets can and should be connected. It is understood that this connection is already being made.

Unfortunately on the east Meadow Street comes almost to a dead-end a block or so before reaching the junction of Frankstown and Fifth Avenues. Owing to the location of the Pittsburgh Hospital, the direct extension of Meadow Street is impracticable and the outlet to Frankstown Avenue can best be secured by widening Finley Street.

27. *Stanton Avenue Connection to the Lincoln District.*—A viaduct should be built from Stanton Avenue, at substantially the point where it enters Highland Park, running over Beechwood Boulevard and the Brilliant Cutoff tracks to that portion of Highland Park lying east of the railroad and now practically unused because of its inaccessibility.

Furthermore, if it shall be possible to acquire a considerable portion of the Highland Cemetery property (still vacant) for residential or other taxpaying use, or if simply a right-of-way can be secured through the cemetery property, a combined thoroughfare and boulevard should be built from the viaduct above proposed, running about as shown on the map and connecting with Lincoln Avenue at the top of the hill. By this line the steep gradients on Lincoln Avenue can be avoided and the high country to the east reached on a gradient of not over $4\frac{3}{4}$ per cent.

28. *Beechwood Boulevard Connection.*—Chiefly for pleasure traffic more street accommodation is needed between the ends of Beechwood Boulevard, at Frankstown Avenue and at Fifth Avenue. As the Pennsylvania Railroad freight yards practically prevent linking the ends of the Boulevard by a new street west of Fifth Avenue, the best plan would be to widen Fifth Avenue, from boulevard to boulevard, enough for two roadways, one for pleasure vehicles and the other for business traffic. (Diagram

No. 10.) The west roadway would be best suited for pleasure travel because more than half of the west frontage is occupied by freight yards requiring access at only one or two fixed points.

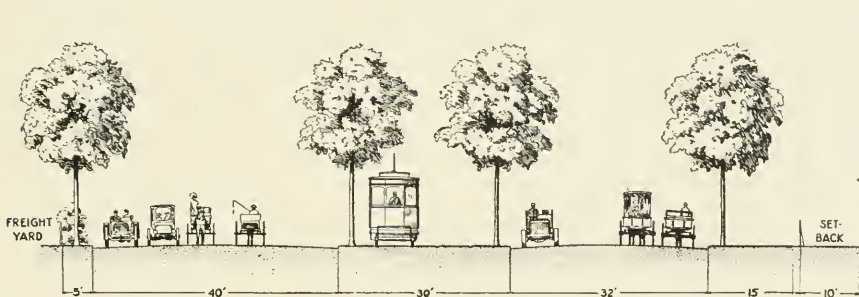


Diagram No. 10. Beechwood Boulevard connection. A possible section

29. *Boundary Street Improvement.*—The plan to relocate and lower the Baltimore & Ohio Railroad tracks in Junction Hollow and to construct a cross-town thoroughfare on the present railroad site, is advantageous to all concerned and, it is hoped, will soon be carried out. The new street (Boundary Street relocated), at its southern end, should connect both with Second Avenue and the proposed hillside thoroughfare (Section 14); with the former by following the present line of Forward Avenue south to Greenfield Avenue, and with the latter by going over the Baltimore & Ohio tracks just north of the present Sylvan Avenue viaduct, and extending west along the bank up to the new hillside street. At its northern end the new Boundary Street would bend to the east, after passing under Forbes Street, and, following the side of the ravine to get an easy gradient, curve westward again and join Fifth Avenue at Clyde Street. A branch to the west could connect with Boquet Street at Joncaire and with Forbes Street at the Schenley Park entrance. (See Bellefield Improvement, Plans A and B, Part IV, pages 102 to 104.)

The new Boundary Street line should further be extended from Clyde Street north to Millvale Avenue at Center Avenue. This will give a continuous cross-town thoroughfare—the first one on a good gradient east of the down town district—from Second Avenue on the south to Penn Avenue on the north, tapping, en route, practically all the radial thoroughfares in the East End.

30. *Murray Avenue Extension.*—Murray Avenue, in Squirrel

Hill, is of secondary importance as a thoroughfare, owing to its steep gradients: but its usefulness can and should be increased by extending the street south along the line of the street railway from Forward Avenue, over Beechwood Boulevard on a viaduct or bridge, to Hazelwood Avenue.

Practically as a continuation of this line and of the Boulevard, the present roadway to Brown's bridge, now maintained by the Street Railways Company, should be widened and improved as a city street.

31. *Beechwood Boulevard Re-alignment.*—Beechwood Boulevard at Monitor Street makes two uncomfortably sharp bends to skirt a ravine. The ravine should be filled out two or three hundred feet from the upper end, and the Boulevard should be carried across on an easy curve at the eastern edge of the fill.

32. *Second Avenue Extension.*—From the Glenwood bridge to the mouth of Nine Mile Run, the old location of Second Avenue, between the Baltimore & Ohio tracks and the river, presents a first-rate opportunity for a riverside street or boulevard. There are practically no buildings or industries requiring river frontage for commercial purposes, and yet there is sufficient room for a riverside thoroughfare of ample width without encroaching too much upon the flood section of the river. In a city where rivers play so vital a part in the commercial development, and form a most telling and characteristic element in the landscape, every opportunity should be seized to enjoy as well as utilize them.

To be well above a maximum flood line, a boulevard along the water's edge would have to be nearly as high as the railroad grade; but to avoid the large cost for river walls and filling, which such a construction would imply, the road could be built at a level only rarely flooded without sacrificing an appreciable amount of its essential value for recreative purposes. At its southern end it would rise over the Baltimore & Ohio tracks, a short distance east of the Glenwood bridge, to connect with the proposed hillside thoroughfare (Section 14); and at its northern end it would rise to connect with Brown's bridge, and from there could extend into the Nine Mile Run valley. A parallel location for this street, on the hillside above the railroad, has been suggested and carefully considered; but it is believed that, owing to the large amount of retaining wall required, the cost of construction

would be almost, if not fully, as great as in the other location, and, other things being equal, it is a very real disadvantage to have a railroad between the river and a road which would otherwise have so much value as a pleasure drive. In either location, however, this street would form an attractive and important link in a hoped-for park and parkway development.*

33. *Batavia Street*.—Frankstown Road is the principal thoroughfare feeding large portions of Penn township and country to the east. The importance of this line means inevitably the concentration of much traffic at the junction of Frankstown Avenue and Oakwood Street where the Frankstown Road begins. Some relief can and should be afforded by improving portions of Batavia Street and extending it to Frankstown Road at Blackadore Avenue. Batavia Street should also be extended across Oakwood Street to Kelly Street, thus encouraging the use of the latter as an approach to the Frankstown Road thoroughfare.

34. *Wilkesburg Grade Crossings*.—In Wilkesburg three important streets,—Rebecca Avenue, South Avenue and Penn Avenue,—cross the Pennsylvania Railroad tracks at grade. Although plans for separating these grades must depend on the general plan of the Railroad for improvements in this region, it seems that the best solution, both for the Railroad and for the people, will probably be to raise the tracks as much as possible and to carry them over the streets. It is supposed that a plan to raise their tracks is now under consideration by the Railroad.

35. *Wilkesburg-Edgewood Connection*.—Improved thoroughfare connections from Wilkesburg through Edgewood to Swissvale, Rankin and beyond are much needed. Pennwood and Edgewood Avenues offer perhaps the most promising route. By sufficiently widening the former from Hampton Avenue to Hutchinson Avenue it can be divided, the east half remaining as at present, and the west half rising gradually to an overhead railroad crossing at Hutchinson Avenue. East of the tracks the street would descend gradually to the south over Race Street to the junction of Swissvale and Edgewood Avenues, forming practically an extension of the latter.

Pennwood Avenue should also be extended along the railroad from Rebecca Avenue to Penn Avenue. If possible, the small

* Part IV, Section 8, page 119

freight yard now in the way should be removed, perhaps to the other side of Penn Avenue, but if this proves to be impracticable it will not be unreasonably indirect to carry Pennwood Avenue around and simply cut back the southerly corner of the freight yard.

36. *Braddock Avenue — Northerly End.*—Braddock Avenue should be an important thoroughfare, cross-town from Franks-town Avenue to Forbes Street, and radial from Forbes Street southeast. North of Penn Avenue it is only located; this portion should be constructed and the railroad grade crossing eliminated.

37. *Braddock Avenue Viaduct.*—To avoid the two, long, bad gradients on Braddock Avenue, crossing the Nine Mile Run valley, a diagonal connection should be made from Henrietta Street and Braddock Avenue to Hutchinson and Laclaire Streets. From the southern end of Laclaire Street a viaduct should be built across the valley, and connections should be made to South Braddock Avenue at the top of the hill and to Monongahela Street at Euclaire Street.

38. *Rankin Improvement.*—Miller Avenue and Fifth Avenue extension continue the Monongahela Street thoroughfare in Rankin. The sharp cramped corners at Harriet Street should be eliminated by cutting a diagonal from Miller Avenue at Gas Alley to Fifth Avenue extension at Harriet Street.

The steep gradients and cramped turns from Hawkins Avenue to Braddock Avenue, at the Braddock borough line, should be short-circuited by extending Fifth Avenue eastward from Hawkins Avenue to Kenmawr Avenue, lowering the grade of the latter or even running under it if necessary to get an easy gradient, and thence running southward along the side of the valley to Braddock Avenue.

The portion of Braddock Avenue north of the Pennsylvania Railroad should connect with this new street by bending sharply to the west, after crossing the tracks, descending on a gradient of 4 or $4\frac{1}{2}$ per cent, and joining the Fifth Avenue extension at about Antisburry Street.

39. *Forbes Street Extension.*—Kelly Avenue is the best extension of Forbes Street from East End Avenue, under the Pennsylvania tracks, to the eastern portion of Wilksburg. The two streets do not connect easily at Peebles Street, and a diagonal

should be run through the Pittsburgh Field Club grounds from East End Avenue to Kelly Avenue.

From Trenton Street to West Street, Kelly Avenue is quite steep; but the gradient can easily be reduced by filling 10 or 12 feet at West Street.

40. *Woodstock Avenue Extension*.—Woodstock Avenue is probably the most important thoroughfare from Swissvale to Braddock, East Pittsburgh, and points up Turtle Creek; but it connects very indirectly at Swissvale with Edgewood and Braddock Avenues, its main feeders. From Rosslyn Street it should be extended to Center Street at the end of the Washington Avenue bridge over the railroad, and from there curve around parallel to the railroad, descending gradually past the Swissvale station to Braddock Avenue. The corner of Noble and Orchid Streets could be lowered to meet the grade of the new street, and the connection with Edgewood Avenue would be via Orchid Street as at present.

41. *Bell Avenue Extension*.—Hawkins and Bell Avenues form the natural extension of the Woodstock Avenue thoroughfare through North Braddock. The connection between these two, however (west of Jones Avenue), is indirect and cramped. Fortunately it can easily be improved; Bell Avenue should be extended northwest along High Street (by widening the latter on the south side), thence, by a viaduct or filling, across the ravine to join Hawkins Avenue at the bend by Penn Street.

42. *Ardmore Thoroughfare*.—The route of the Ardmore car line offers a first-rate opportunity for a direct thoroughfare from Wilkinsburg to East Pittsburgh and thence up Turtle Creek. Such a thoroughfare is much needed, partly because it will open up for development large areas of the back country in Wilkins and Braddock townships and partly because, owing to the already dense development in Rankin, Braddock and Bessemer, efficient thoroughfare widenings between the steep hills and the river would be so expensive as to be hardly justified and very difficult of attainment. The need for extensive street widenings through these districts will be practically eliminated by a thoroughfare of easy gradient along the Ardmore route. It is understood that the County has already begun the construction of this street.

43. *Wilkins Township Thoroughfares*.—From Wilkinsburg,

Penn Avenue is the chief thoroughfare approach to most of the hilltop country in Wilkins township, feeding it via the Greensburg Pike and another highway to the east. Its gradient is very bad. A new approach can be made to the high land on an easy gradient by branching to the north from the proposed Ardmore thoroughfare (Section 42 above) about 3,000 feet east of Franklin Avenue, crossing the mouth of the first valley and following up the side of the eastern valley to the hilltop roads.

As a further improvement, opening up this high land and connecting the important radial thoroughfares, this new street should be extended north along the hilltop to Frankstown Road.

44. *Greensburg Pike*.—From the northwest the Greensburg Pike (or Penn Avenue) descends into Turtle Creek with many sharp angles and a very steep gradient. A new hillside street descending the west side of the hill, rounding the nose thereof, and thence extending northward down to the valley level at Turtle Creek, is not an impossible solution of the present difficulties.

45. *Greensburg Pike South of Turtle Creek*.—South of Turtle Creek the Greensburg Pike again ascends the hill on a pretty steep gradient. In part at least this gradient can be improved by making the route somewhat more circuitous.

46. *Streets Run*.—From the Glenwood bridge one thoroughfare, destined to be of importance, follows the valley of Streets Run to Miller's Grove, branching there into lines feeding Snowden, Jefferson and the southern portions of Baldwin and Mifflin townships. The street needs, in addition to widening, some re-alignment and regrading. At several points where it crosses the Run, the fords should be replaced by bridges.

47. *Dravosburg and Mifflin Township Thoroughfares*.—Going south from the Glenwood bridge the first valley branching eastward from Streets Run leads to the high land at Lincoln Place. Irwin Street is the present thoroughfare in this valley, but towards its upper end it becomes rather steep for main thoroughfare purposes. The most feasible plan to reach the southern highlands of Mifflin township and to connect with Dravosburg and thence up the Monongahela, is probably to follow up the south fork of the Irwin Street valley, climbing gradually but steadily along the hillside, and reaching the high land above the head of Thompson Run. From this point branch roads can tap much of the hilltop

land of the township. Extending southeast the main road would cross the ridge south of Thompson Run, and descend gradually along the south side of the ridge to Dravosburg; there it would connect with lines up the Monongahela River.

The high land between Streets Run and Whitaker Run can probably be best served by a hillside road following up the valley between Homestead and West Homestead.

48. *Eighth Avenue Improvement.*—The Eighth Avenue extension, from Munhall to Duquesne, has for the most part a satisfactory gradient for a main thoroughfare; but just south of Green Spring it is unnecessarily steep. The road can easily be shifted a little down the hill, and the climb lengthened enough to get a very easy gradient.

The location of this thoroughfare high on a precipitous hillside overlooking the river and the enormous industrial plants at Braddock and Bessemer, vital elements in the development of the Pittsburgh District, presents an opportunity for scenic value which should not be overlooked. The natural beauty of the hillside and the interesting outlook over the river should be preserved.

49. *Eighth Avenue Branch Westward.*—The best way to reach the high land west and northwest of Duquesne is from the Eighth Avenue thoroughfare. A branch could easily wind up the hill from the vicinity of Kennywood Park, and thence cross the hilltops forming a main east and west thoroughfare.

50. *Eighth Avenue Branch to Dravosburg.*—From the next plateau south of Kennywood Park a branch could be extended southwest across Thompson Run (on a viaduct) and along the high land south of the Run. By branches, very little steeper than the main road, good connections can be secured with Duquesne and Dravosburg.

51. *Duquesne Bridge.*—The bridge from Duquesne to McKeesport has cramped and dangerous approaches at both ends. The northern approach should be widened and made less abrupt. The southern end of the bridge should be lifted and the bridge extended over all the railroad tracks.

52. *California Avenue and Brighton Road Extension.*—Coming now to the North Side, one of the most important thoroughfare routes runs northwest through Bellevue, Avalon, Ben Avon, Emsworth and down the Ohio River to Sewickley, Leetsdale

and points beyond. California Avenue in Allegheny, Lincoln Avenue in Bellevue, California Avenue again in Avalon, then either Brighton Road in Ben Avone, and the old Beaver Road in Emsworth, or the route followed by the street-car line through these two boroughs, and the Beaver Road again beyond, practically comprise this thoroughfare.

Connecting with Stockton and Marion Avenues, a street should be cut through West Park, North Side, adjacent to the east side of the railroad from Ohio Street, to the junction of Irwin and North Avenues. Thence a diagonal should be cut through to the corner of Pennsylvania Avenue and Fremont Street. (Diagram No. 11.) These changes, together with the widening of Fremont Street and Washington Avenue, will give a proper

and sufficient outlet (and inlet) for both the California Avenue and the Brighton Road thoroughfares.

California Avenue should also be cut through, adjacent to the railroad, from the corner of Sedgwick and Kirkpatrick Streets to Wolf Alley.

53. *Brighton Road Viaduct.*—In Ben Avon, Brighton Road makes a steep

and circuitous dip into the Spruce Run valley. This may be avoided by carrying the street across the ravine on a viaduct from about Park Street on one side nearly to Dickson Avenue on the other.

54. *East Street.*—On account of its steepness, and the difficulty of improving the gradient, Perrysville Avenue will never be a main

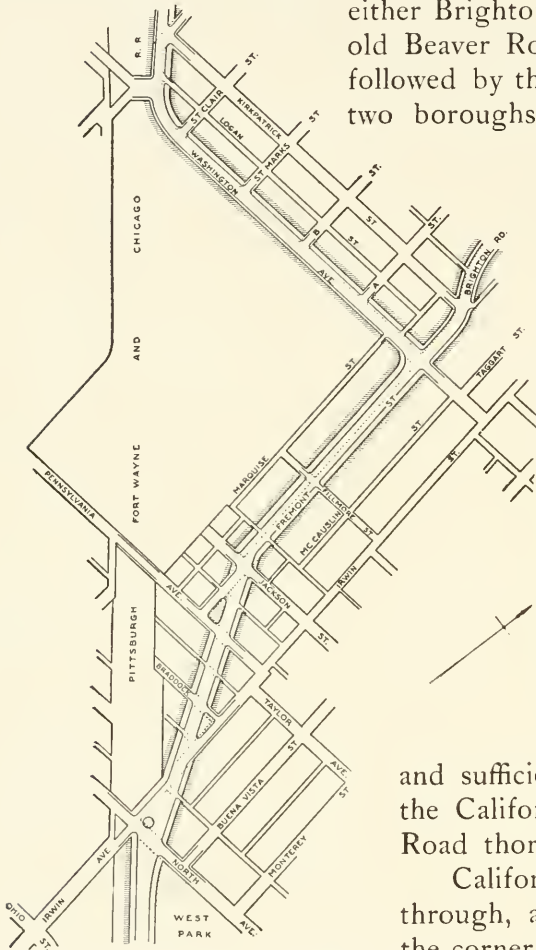


Diagram No. 11. Connection from West Park, north side to California Avenue and Brighton Road.

thoroughfare except to the high country immediately north of the down town North Side. East Street, therefore, must eventually become the principal thoroughfare leading north. Its gradient is easy and it needs only widening. Throughout much of its length (except at the southern end) the widening can now be done, mostly on the east side, with comparatively little expense for building damage. The physical widening, however is most urgently needed from Third Street to Madison Avenue, where the thoroughfare is only 40 feet wide and is closely built up.

Spring Garden Avenue is a thoroughfare; but as practically all the territory which might be reached thereby, except the narrow valley in which the street runs, can be served perfectly well from East Street and from other lines, the expense of widening Spring Garden Avenue and its approaches seems scarcely justifiable.

55. *Troy Hill Road*.—Troy Hill Road is the thoroughfare to Troy Hill and the ridge to the north in Reserve township. From Ohio Street up to the plateau level it is quite steep, about 8 per cent. The only feasible improvement is to run a new hillside street from Vinial Street at Wooster around the west nose of the hill and up the north side to Lowry at Gardener Street. The gradient can thus be reduced to about 5 per cent. But because of the somewhat limited area to be served by this thoroughfare, and the considerable expense of constructing such a road, this improvement is not urged as of special importance.

56. *Lowry's Lane*.—From Ravine Street north to the county road, Lowry's Lane, a link in the Troy Hill Road thoroughfare, is very steep (about 10 per cent). From the foot of the hill a street can easily be run around the west side of the hill, reaching the county road at its southern end. By this short detour the gradient will be reduced at least one half. It is understood that the County has already started an improvement of this nature.

57. *East Ohio Street*.—East Ohio Street with its extensions—Butler Street, Main Street, Freeport Street and the Freeport Road—forms the only thoroughfare from the North Side through Millvale, Etna, Sharpsburg and Aspinwall up the Allegheny River. Most of the way from Troy Hill Road to Etna, the street is in sore need of widening and paving. Where it is adjacent to the railroad one sidewalk can be omitted and that much width saved.

At Millvale the grade must be raised to meet a new approach over the railroad to the Forty-third Street bridge. (Section 6.)

58. *Millvale Thoroughfare*.—Girty Run valley, at the mouth of which is Millvale, must inevitably be the route of the trunk line for a most important northern thoroughfare system. Thoroughfares following Girty Run and its numerous branches can reach Westview, Perrysville and all parts of Ross and McCandless townships and points north, on reasonable gradients.

From the mouth of the valley up to Evergreen, the present thoroughfare, comprising Grant Street, North Avenue, Klopfer Street, and the Evergreen Hamlet Road, is narrow and in some cases very crooked, and is more or less closely lined with buildings. Improvements on this line have not been studied in detail but much widening and some re-alignment is urgently needed. Probably the widening of Grant Street will be more satisfactory than paralleling it with a new street.

59. *Etna Improvement*.—Etna is at the mouth of the Pine Creek valley, the route of another very important thoroughfare system. Butler Pike, the Middle Road, Kittanning Pike and the three valley roads following Pine Creek and the two Little Pine Creeks, reaching all available country to the north on easy gradients, converge at Etna.

To avoid the bottle neck at the Spang-Chalfant mills a new street should be run west of the mills from Bridge and Butler Streets over the creek and the railroad, joining Butler Street again a little west of the Kittanning Pike. A branch should descend from this overhead street westerly to the street which parallels the railroad tracks on the south and connects directly with the Butler Pike and the line up Little Pine Creek west.

Further improvements on these thoroughfares have not been studied in detail, but numerous widenings and re-alignments are needed, especially in the Pine Creek thoroughfare.

60. *Sycamore Street Grade Crossing and Bridge Street Improvement*.—Bridge, Freeport and Main Streets should be lifted over the Baltimore & Ohio tracks at Sycamore Street. Bridge Street had best be kept up, probably on a viaduct, clear to the Sharpsburg bridge. The South Main Street approach to this bridge will thus be cut off, but another eastern approach will be provided. (Section 61 below.)

61. *Allegheny River Boulevard*.—From the Sharpsburg bridge up the river to Hoboken and possibly to Montrose, a first rate opportunity is presented for a riverside thoroughfare or boulevard. Such a line will have rare scenic value and will also take much traffic from Main Street and the Freeport Road. It is understood that the Pennsylvania Railroad owns all the land from the Sharpsburg bridge to Aspinwall between the river and Main Street, but as no railroad development has yet taken place it seems not unlikely that sufficient land can be obtained next the river for the boulevard.

At its western end this new street would connect by a viaduct directly with the Sharpsburg bridge.

62. *Main Street Grade Crossing*.—The railroad grade crossing on Main Street (Sharpsburg), near North Canal Street, is peculiarly dangerous because the sudden angles in the street interrupt all view of the crossing until one is almost upon the tracks. No better way of separating the grades appears than to raise Main Street and carry it over the railroad. The railroad grade might be lowered somewhat but probably not enough to materially reduce the grade damages for filling on Main Street.

A connection should be made from the bend just east of this crossing out to the riverside boulevard proposed above. (Section 61.)

63. *Squaw Run Thoroughfare*.—North from Claremont is the valley of Squaw Run with its branch Stonycamp Run. The thoroughfare in this valley should be extended south to the Freeport Road and the proposed riverside boulevard. (Section 61.)

64. *Carson Street*.—South of the Ohio and Monongahela Rivers, Carson Street is a continuous thoroughfare from Ormsby, on the east, to McKees Rocks and points down the Ohio River, on the west. All thoroughfare lines from the south and west feed into Carson Street and are thence distributed to the bridges leading into the city proper. This street is of varying width, nowhere (except for ten blocks east of South Seventeenth Street) more than 50 feet and often much less.

(a) From Brownsville Avenue to South Seventh Street the vehicle capacity of the street can be somewhat increased by removing the south sidewalk which is next to the railroad. This improvement, however, would not obviate the need for a general

widening of the whole street. The gradient from South First to South Fourth Street should be reduced by filling at the former end and cutting slightly at the latter.

(b) From the Point bridge to Main Street (West End) West Carson Street is most in need of improvement and is at the same time most difficult to improve. Though much study has been put upon this problem, no plan has been hit upon less expensive or less difficult of accomplishment than a generous widening accompanied by slight re-alignment. By widening entirely on the south side most of the property between the street and the Panhandle Railroad would be taken and what is left could be used for warehouses, coal pockets and the like. The manufacturing property north of Carson Street would thus be undisturbed.

(c) From the West End to Corliss Street, Carson Street is confined between two railroads. As there is no abutting property available for buildings, one sidewalk is sufficient and that could be reduced to a minimum width of 8 or 10 feet. Furthermore, as the street is for the most part well above the Pittsburgh and Lake Erie tracks the sidewalk might be bracketed out over the tracks, thus leaving a clear roadway of at least 48 feet.

(d) From Corliss Street to McKees Rocks, West Carson Street can readily be widened on the southwest side. One sidewalk will still be sufficient.

65. *Chartiers Avenue Grade Crossing*.—Chartiers and Island Avenues are the main connections from West Carson Street through McKees Rocks. Close to the junction of these streets, where the Pittsburgh, Chartiers & Youghiogheny Railroad crosses Chartiers Avenue at grade, the street should be raised and the tracks somewhat lowered to separate the grades.

66. *Wind Gap Road*.—The Wind Gap Road is the present thoroughfare from McKees Rocks to Ingram and Crafton. The connection with Chartiers Avenue should be improved by carrying the street on a viaduct over the creek and both the railroads in the valley, and then cutting an approach through, running about north, from Caughey Street to Chartiers Avenue.

67. *Corliss Street*.—With the improvement of West Carson Street, its connection with Corliss Street becomes important. Corliss Street should be carried underneath both the Panhandle and the Pittsburgh, Chartiers & Youghiogheny tracks to West

Carson Street. Chartiers Avenue and Corliss Street will thus form a short line of fair gradient to the high portions of Sheraden and Esplen.*

68. *Crafton Hillside Thoroughfare*.—From Main Street (West End) the Noblestown Road is a main thoroughfare on reasonable gradients to Carnegie and points south and east. From the sharp turn near Stratford Avenue (Chartiers township) a main branch into Crafton should follow the present street railway line. On the steep hillside it should be constructed as a three-level street, cars in the middle and a roadway on either side.

69. *Crafton-Carnegie Connection*.—There is no direct connecting highway between Crafton and Carnegie. A street should be constructed from Ridge Avenue to Idlewood Avenue along the street car line just north of the Panhandle Railroad.

70. *Washington Road*.—Washington Road through Greentree borough is an important hilltop thoroughfare feeding into West Carson Street through the West End. From the hilltop down to Woodville Avenue it is undesirably steep. A new road should be built from the top of the hill running northward down the west bank of the valley, rounding the nose of the hill and running west about a thousand feet, then crossing the ravine on a viaduct and joining the Noblestown Road just west of West End Park. The gradient on such a road would not be over five per cent.

71. *Sawmill Run Thoroughfare*.—Sawmill Run valley offers a splendid opportunity for a connecting and radial thoroughfare from the West End to Bell Tavern and thence south to Fairhaven, Castle Shannon, and points beyond in Bethel, Snowden and Jefferson townships. Branching to the southwest would be at least two important valley thoroughfares, the Banksville and West Liberty Roads. Woodville Avenue, from the West End through Shalerville, is the start of such a thoroughfare. It should be improved and extended up the valley, past the Bell Tavern, to Oak Station and the Library Road. Such a thoroughfare should be designed as part of a boulevard system.†

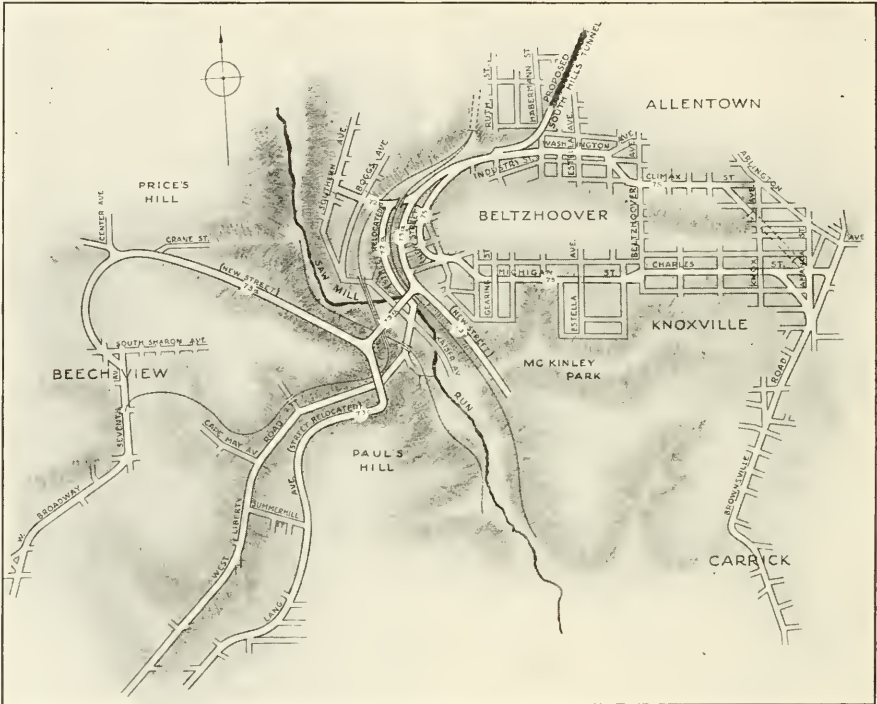
The proposed traffic tunnel to the South Hills will come out in the valley between Mt. Washington and Beltzhoover, probably a little east of the south portal of the present street car tunnel. To serve its best purpose this traffic tunnel must have thorough-

* This improvement is provided for in the current bond issue.

† Part IV, Section 7, page 119.

fare connections on reasonable gradients to all available land south of Mt. Washington and Allentown and east of Little Sawmill Run. The more important thoroughfare extensions from the tunnel are noted below, Sections 72 to 75 inclusive.

72. (a) *Washington Avenue Improvement*.—Washington Avenue forms too steep a line up to the tunnel from the valley thoroughfares—the West Liberty Road and the Sawmill Run Road



A plan showing the thoroughfare extensions from the proposed South Hills tunnel.

Figures refer to the descriptive paragraphs in the text

proposed above (Section 71). A reasonable gradient can be secured by raising the grade of the West Liberty Road north from the West Side Belt railroad bridge to Kaiser Avenue, thence running a bridge north across the valley, then climbing gradually northward along the hillside and joining Washington Avenue just below the Castle Shannon railroad bridge. Above this point Washington Avenue should be regraded by cutting at the top of the steep portion, thus getting an easy gradient to the new tunnel.

(b) *Southern Avenue Connection*.—From a point just below

the Castle Shannon railroad bridge a branch connection should be run west across the valley to Boggs Avenue, about at Minsinger Street, thus connecting the new tunnel with Boggs and Southern Avenues leading to Mt. Washington.

73. (a) *Beechview Thoroughfare*.—The higher lands to the south, upon which most of the future development will take place, can best be reached by a street around the west end of the Beltzhoover ridge at, or slightly above, the level of the Castle Shannon railroad, about the location of the present Boggstown Avenue. From a point two or three hundred feet east of Sylvania Street a sloping viaduct should be run southwest up over the street railway bridge and the West Side Belt tracks to the nose of the opposite hill. From here a new street should be run west climbing gradually along the north slope of the hill to the high land at the northern end of Beechview. An extension of this line should then be made from Crane Street and Center Avenue southerly along the west side of the Beechview ridge joining Seventh Avenue just south of South Sharon Avenue. Beechview and the West Broadway thoroughfare, running south along the ridge, can thus be reached on a gradient under 4 per cent instead of $6\frac{1}{2}$ or 7 per cent along the present street car right-of-way, or considerably more than that on the present streets. The viaduct from Southern Avenue to Price's Hill, proposed in the recent bond issue program, has been studied with some care, but the steep gradients it would require—6 per cent or over—to reach the hilltop land have led to its abandonment in favor of the plan just proposed.

(b) *West Broadway Extension*.—West Broadway should be extended along the present street car route from Snyder Street south to the junction of the Banksville and West Liberty Roads.

(c) *Lang Avenue Connection*.—Starting again from the southerly end of the above proposed viaduct over Sawmill Run, a street should be built running south over the West Liberty road and striking the opposite hillside at or just above Lang Avenue. Southwest from here, nearly to Summerhill Street, Lang Avenue should be shifted slightly down the hillside to reduce its gradient from about 12 to 4 or 5 per cent.

(d). *Sawmill Run Hillside Thoroughfare*.—Returning now to the northerly end of the proposed viaduct over Sawmill Run, the thoroughfare from Washington Avenue should be extended south

along the Castle Shannon railroad to the Library Road at Oak Station. The road should be built on the uphill side of the tracks to facilitate running branch roads to the high country east thereof. If the Sawmill Run valley shall become park land* this new street will be a border drive with a commanding location overlooking the park.

74. *Fairhaven County Road.*—Just south of Fairhaven the county road climbs the hill to the Brownsville Road on a 10 per cent gradient. This can easily be reduced one half by shifting the road a little west, down the hillside, and reaching the high land twelve hundred feet farther south.

75. *Carrick Connection from the South Hills Tunnel.*—Perhaps the most important district to be reached, via the proposed South Hills tunnel, is that tapped by the Brownsville Road, i. e. Mount Oliver, Lower Saint Clair, Carrick and most of Baldwin township. To serve this district requires a thoroughfare connection past the bad gradients of the Beltzhoover ridge, to Brownsville Road at or beyond Charles Street.

There appear to be two possible routes for such a connection.

The shorter is as follows; along Washington Avenue east to Curtin Avenue, thence diagonally southeast to Climax Street, along Climax Street widened to a point about 200 feet east of Allen Street and thence diagonally southeast and through a short tunnel under the ridge to the corner of Charles and Amanda Streets. Amanda Street connects south to the Brownsville Road; and Charles Street, if widened straight through to the Brownsville Road, would furnish a reasonably direct connection with Arlington Avenue leading along the ridge to the east. This route could probably be brought to a very reasonable gradient, say $3\frac{1}{2}$ per cent as a maximum.

The other route is by a new street rising around the northerly end of the Beltzhoover ridge and connecting with Michigan Street. The latter would be widened and regraded, cutting through the two narrow ridges over which it now humps at Gearing Street and Estella Avenue. These streets would be carried over it by bridges at the present grade. The improved Michigan Street would be connected with Charles Street; and the latter would be widened and improved in gradient, with another separa-

*Part IV, Section 7, page 119.

tion of grades at Knox Avenue where there is now a sharp hump in the Charles Street profile. Instead of following Charles Street through to a right-angle corner at Amanda, the thoroughfare might curve at the end so as to join Amanda Street a block or two farther south. This route is at least two thousand feet longer than the other, but if the mouth of the tunnel is not dropped too low, it can probably be brought to a maximum gradient of not over $3\frac{1}{4}$ per cent.

In the absence of complete and accurate information as to grades and distances throughout these two routes, it is impossible to say which is to be preferred. If, upon further study on the basis of reliable topographical data, it should develop that a materially better gradient can be secured by the longer route, that line would be the more desirable. But if the saving in gradient should prove to be very slight, perhaps not more than a third or a half of one per cent, it is believed that the shorter route, that via Climax Street, should be adopted.

76. *Arlington Avenue and Washington Avenue Connection.*—Arlington Avenue is the direct road east from the junction of Washington Avenue and the Brownsville Road, but between this point and South Eighteenth Street it has two bad gradients, 7 per cent and over. To get a good cross-town connection without such gradients and at the same time to give better access to the Mount Oliver incline, Washington Avenue should be widened east from the Knoxville incline to Amanda Street,* and thence cut through on a curve to the corner of Angelo and Mount Oliver Streets. By widening Mount Oliver and Freeland Streets, by rounding off the east corner of Amanda and Freeland Streets and by cutting back the southwest corner of Freeland and South Eighteenth Streets, a nearly level, though somewhat circuitous, connection can be secured between Washington Avenue on the west and Arlington Avenue on the east.

77. *South Eighteenth Street.*—Plans have been proposed, by the Bureau of Surveys, to widen, pave and otherwise improve South Eighteenth Street from the South Side up the hill to Arlington Avenue. The gradient, which is now about 7 per cent, cannot be improved without very radical and costly changes in the street location; and since the proposed South Hills tunnel will reach, on easy gradients, practically all the hilltop territory now served by

* Improvement to this point is provided in the current bond issue.

South Eighteenth Street, the trouble and cost of materially reducing the South Eighteenth Street gradient seems hardly justified.

The plans of the Bureau of Surveys propose a roadway width of 40 feet with two sidewalks each 10 feet wide in some places and in others $7\frac{1}{2}$ feet. This means a widening of from 5 to 20 feet. As this entire section of South Eighteenth Street is on a hillside mostly steeper than one in three, such widening will require from 2 to 7 feet of additional retaining wall, or excessive

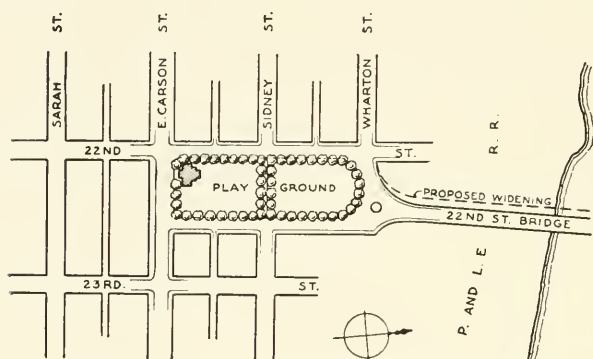


Diagram No. 13. Twenty-second Street bridge approach—South Side

cutting and filling, which means large damage to property in the vicinity. Furthermore, the adjacent hillsides are so steep that no extensive development of abutting property is likely to take place.

In consideration of all these points

it is urged that a width of not less than 45 feet nor more than 50 feet be adopted in the improvement plans. This will give a roadway 35 feet and one sidewalk 10 feet or more in width.

78. *Brownsville Road*.—The Brownsville Road, climbing the hill from Carson Street, is similarly situated. Any improvements which may be contemplated therein should be governed by the same considerations as those cited above in connection with South Eighteenth Street.

79. *South Tenth Street*.—From the south end of the Tenth Street bridge to Muriel Street, South Tenth Street is cramped down to a total width of 45 feet, with a roadway only $26\frac{1}{2}$ feet wide, because of a freight area 10 or 12 feet wide next to the Oliver Iron and Steel Company building. This area should be covered and the street widened.

80. *Twenty-Second Street Bridge Approach—South Side*.—The approach from East Carson Street to the Twenty-second Street bridge is cramped and crooked. The corner from the bridge into

Wharton Street should be rounded back and an additional approach should be run along the east side of the playground. Some additional playground space can be secured by closing Sidney Street, between South Twenty-second Street and South Twenty-third Street, except for pedestrians. (Diagram No. 12.)

Several other changes in the outlying thoroughfares are marked in red on the accompanying plan but are not specifically noted in this report. They are suggested changes to improve certain steep gradients but have not been thoroughly studied on the ground.

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LOCATION MAP FOR
80 IMPROVEMENTS
IN THE OUTLYING
THOROUGHFARES

(ATTACHED OPPOSITE THIS PAGE 92)



PITTSBURGH CIVIL COMMISSION
MAP OF THE
PITTSBURGH DISTRICT
SCALE IN MILES

EXPLANATION
IMPROVEMENTS PROPOSED IN EXISTING THOROUGHFARES SHOWN WITH
NEW THOROUGHFARES PROPOSED SHOWN WITH
EXISTING THOROUGHFARES NOT SPECIFICALLY DESCRIBED SHOWN WITH
RED NUMBERS REFER TO PARAGRAPHS IN THE TEXT OF
"OUTLYING THOROUGHFARE IMPROVEMENTS"

FREDERICK LAW FLEMING
CONSULTANT CITY PLANNING

PART III

Surveys and a City Plan

NO CITY of equal size in America, or perhaps in the world, is compelled to adapt its growth to such a difficult complication of high ridges, deep valleys, and precipitous slopes, as Pittsburgh. By consequence no other city has such imperative need of accurate and comprehensive surveys, as a basis for the layout of streets, sewers, and all public works, for the purpose of avoiding the extravagant mistakes, misfits, and reconstructions that are bound to result from groping, piecemeal work done amidst such obstacles.

Pittsburgh's
Need for Surveys

New York, Baltimore, Washington and other American cities, where the need is far less crying than in Pittsburgh, have awakened to the importance of modern, accurate and comprehensive topographical maps as a basis for the intelligent and economical planning of public improvements, and have provided themselves therewith. But Pittsburgh, having less excuse for the omission and paying a heavier penalty for the blunders to which it gives rise, lags in the same class with too many unprogressive cities in this country where the official surveys are merely incomplete and casual records of streets, properties and public works, gradually accumulated through a long series of years. These records consist, for the most part, of independent piecemeal surveys of all degrees of accuracy and inaccuracy, made for all sorts of purposes, and of compilations and transcripts of these piecemeal records patched together in attempts to reconcile irreconcilable data.

It is not necessary to give a long list of examples of the incompleteness and the inaccuracy of much of the old data of which the Bureau of Surveys is the official repository in Pittsburgh. Every surveyor and engineer in Pittsburgh with whom I have talked, whose work has given him occasion to use this data, is familiar with the conditions; with the fact that the tapes used in the original surveys of different parts of the city differed in length and that

the errors were never compensated, so that today, measurements in different parts of the city have to be made with special tapes of particular degrees of inaccuracy in order to conform to the records; with the fact that independent bench marks are used in different parts of the city and that discrepancies of several feet, and sometimes of unknown amount, in elevation occur in the records of adjacent or intersecting streets; with the fact that an extraordinarily large proportion of the streets are not marked by any permanent monuments, and that there is no adequate system for protecting the monuments that do exist, so that the City often has no sure recourse against abutting owners who have encroached upon a street; and finally, that no general official surveys whatever exist of the complicated topography of the undeveloped areas. And yet through these undeveloped areas, streets and sewers and other public works are almost daily being extended without knowledge of what lies beyond, although from the back regions soon to be developed, *somehow, sometime, outlets must be provided.*

The city charter places upon the Bureau of Surveys the onerous and important duty of reporting favorably or unfavorably to Councils upon the plan of every new street proposed to be laid out by any one whomsoever within the city; yet the Bureau, presumably through lack of funds, has never had the data in hand upon which *alone* such a report could be intelligently based.

No criticism of the present Bureau, or indeed of its predecessors, is intended in these remarks. The blame falls upon the whole system of penny-wise, pound-foolish, hand-to-mouth procedure in regard to city surveys that has been characteristic of a large proportion of American cities in the past, and of Pittsburgh with the rest. It is earnestly recommended that Pittsburgh should take example from the cities of Europe and from such American cities as New York, Baltimore and Washington. And because its peculiar topography is bound to make the evil results of unprogressive medieval methods more serious than in other cities, it should take the pains to surpass, rather than to lag far behind, in this respect.

Objects To Be Secured	In outline the objects to be secured are these: (a) An accurate framework of reference points needs to be established, including: 1. The gradual systematic setting of permanent street monuments throughout
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the city to serve as reference points for the definite determination of street locations and for all public and private local surveys.

2. The accurate determination of the locations and elevations of these and other monuments and bench marks in reference to a single general system of coördinates and in reference to the United States Government bench. 3. As a means of accomplishing these ends, an accurate geodetic triangulation of the district, supplemented by the necessary precise traverse work and precise leveling, all fully checked and compensated for errors.

(b) The existing local surveys and records need to be tied into the accurate framework thus established, and in cases which show deficiencies or discrepancies beyond a reasonable and carefully defined standard of accuracy, they need to be gradually, in due turn, re-surveyed and re-plotted.

(c) Complete topographical maps, based upon the framework first described, should be prepared upon some uniform system beginning in those sections where public works are immediately contemplated and gradually extended so as to cover the whole area into which the city's growth is likely to spread.

In the facts which would be gathered in the above process, and only in such facts, can a safe basis be found for plans that will provide the most economical and effective layout of new streets, sewers, parks, water system—in short for a city plan that will minimize the total draft on the taxpayers for public works and give the maximum results for money expended.

Technical Procedure The actual steps of technical procedure called for, in addition to the present routine work of the Bureau of Surveys, appear to be about as listed below. I omit at this point any consideration of the method of deciding on the plans for future improvements—the city planning proper, which would be based on the surveys—or of the procedure for enforcing any part of a city plan when adopted, and consider only the work of recording and mapping.

The steps that are mentioned last are more or less dependent upon those mentioned first, for any given area of the city, but the several steps of the work would be carried on more or less simultaneously, and some of the results would become available for use at once. 1. The establishment of reference points by triangulation and precise traversing and leveling throughout the

district, and the reduction of these points to a general coördinate system. 2. The surveying, in relation to the new coördinate system, of existing street monuments and reference points, and of existing buildings, fences, bound-stones, and other evidences of ownership; and the preparation of general topographical maps. 3. The determination of the correct location of the legal boundaries of streets and public properties, and the translation of the old descriptions, running lines, etc., into terms of correct descriptions related to the new coördinate system. 4. The verification or correction of the legally established street profiles in terms consistent with the real distances and levels. 5. The setting of additional street monuments. 6. The draughting and publication of maps.

Maps The maps might ultimately include the following features, every one of which is to be found in the maps of one or another of the progressive cities of this country and Europe, and many of them in all.

(a) A general one-sheet map of the city and vicinity, showing the streets, the boundaries of civil divisions, the coördinate system, and the locations of primary reference points and bench marks. This will serve as an index to the maps on a larger scale.

(b) A general topographical map in sections, to be published by lithography, one sheet at a time as completed, on a scale of (say) 200 feet to the inch, showing all existing streets and roads, buildings, property lines, surface grades (by contours and points) and other topographical features, and all monuments and benches. This might be, and should be, so arranged that new and corrected editions of individual sheets could be gotten out at reasonably frequent intervals so as to keep it permanently up to date. Moreover it could well be made to serve all the purposes of the inaccurate but useful real estate atlases now gotten out by private enterprise. A charge of (say) twenty-five cents a sheet would cover the cost of printing, and, if some form of loose-leaf atlas cover were gotten out into which new editions of single sheets could be inserted, the public could obtain, at no extra cost to the city, and for a price about equal to that charged for the ordinary real estate atlas, a much more useful and accurate and up-to-date volume. Of course this map would serve all the purposes of the assessors' maps far better than anything they have now, and, if

experience in other cities is any criterion, would lead to the discovery of a good deal of untaxed property.

To accomplish the above purposes the best method of reproduction would probably be to have the maps engraved on aluminum sheets, from which transfers can be quickly and cheaply made at any time to a lithographic stone for printing. Such sheets can be readily and indefinitely corrected.

(c) Record sheets at a much larger scale, showing all the information contained on the small scale sheets and also construction details relating to public properties, especially streets, such as pipes, sewers, conduits, etc.; to be prepared at first for limited areas only but gradually extended.

(d) A system of indexing and filing, to include, to keep track of, and to keep up to date, the records of existing physical conditions in areas covered by the surveys. This would include keeping track of the legal instruments affecting the physical conditions within streets and other public properties, or affecting the control over them; such as deeds, ordinances, and other instruments relating to the layout and grades of streets, permits and franchises for the construction or maintenance of anything within them, executive orders for new constructions or changes, and inspectors' reports of new constructions and changes actually made. As a part of this indexing and correcting system, provision could readily be made for periodical transmission of information as to changes in property ownership from the Assessors' Office (originally from the Registry of Deeds) to the Bureau of Surveys, so as to permit keeping the record maps always up to date and accurate. By means of similar transmission of records from the office of the Building Inspector, the record maps could be kept up to date with respect to new buildings. A typewritten multigraph notice of changes and corrections from all sources, made on the record sheets, could be mailed monthly to all the city Bureaus and others having sets of prints, and at longer intervals new and corrected prints of certain sheets would be offered. This would be the same general plan that is followed in regard to changes and corrections on the charts of the Coast Survey and the official Coast Pilot books, where the Notices to Mariners are issued periodically from the Hydrographic Office, and summed up at longer intervals by new editions of the several

volumes and of the various charts stamped to show the dates to which they are corrected.

**Management
and Cost**

It would seem advisable to put a first-class man of broad experience and ability in charge; to establish a new division under the Bureau of Surveys, coördinate with the existing force, which is dealing with the current routine work, but distinct from it; and to go at the work with an annual appropriation amounting, after the first six months or so devoted to organization, to say \$50,000 a year until the arrears of work shall have been cleaned up.

Sample Maps

The following data in regard to the topographical survey work of New York and of Baltimore is of considerable interest in this connection. There are on file in the office of the Civic Commission single copies showing the kind of sectional topographical maps published by the official surveys of New York, of Baltimore, of the District of Columbia and of Zurich, Switzerland (representing European cities); and a sheet of the large-sized detailed sectional map published by the City of Paris, which covers the whole city at the scale of $\frac{1}{50,000}$ or about 40 feet to the inch.

New York

In the City of New York, for the first four years after the consolidation in 1898, the work of preparing a comprehensive topographical map, and, upon the basis thereof, a general plan of streets, was in the hands of the Board of Public Improvements; but most of the work has been done since the establishment of independent Topographical Bureaus in 1902. It is now proposed by the Comptroller that the Bureaus of the several Boroughs be again centralized under the Board of Estimate and Apportionment. The triangulation, upon which the whole work depends, was done in coöperation with the United States Coast and Geodetic Survey.

The following tables indicate the magnitude of the work and the amounts expended up to December 31, 1909, the force required to prosecute the work and a detailed analysis of the cost of the work in the Borough of Queens. The last table is taken from a report of Assistant Engineer H. K. Endemann to W. C. Elliott, Engineer-in-charge. In the first table, no data are given as to Manhattan and Brooklyn because of the abnormal conditions which they present.

AMOUNT AND COST OF WORK

	Bronx	Queens	Richmond	Totals
Population (1910)	430,980	283,041	85,969	
Total area in acres	26,523	75,111	36,480	138,114
Triangulation (in acres)	26,523	75,111	36,480	138,114
Topographical Survey (in acres)	26,523	55,188	18,430	100,141
Tentative Street Maps Approved (in acres)	18,700	19,661	6,300	44,661
Final Maps Adopted (in acres)	13,000	9,912	6,300	29,212
Expenditures 1902-1909	\$779,916	\$1,281,946	\$839,975	\$2,901,837
Recommended for 1910	\$160,395	\$362,752	\$218,000	\$705,147

On March 31, 1910, the forces of the several topographical Bureaus of New York were as follows:

	Bronx	Queens	Brooklyn	Richmond	Totals
Engineers in charge and principal assistant engineers	1	2	2	1	6
Assistant engineers	17	15	16	17	65
Transitmen, computers and draftsmen	26	53	17	41	137
Chainmen, rodmen, axemen and levelers	21	18	12	17	68
Clerical	3	6	5	2	16
Laborers	7	62	11	25	105
Foremen, drivers and others	3	15	2	8	28
Total	78	171	65	111	425
Expenses recommended for 1910 . . .	\$160,395	\$326,752	\$80,000	\$218,000	\$785,147

The work is expected to be so far advanced as to permit of material reductions in the present staffs at the following dates: in the Bronx, December 1911; in Queens, April 1915; in Brooklyn, April 1913; in Richmond, June 1911.

A detailed analysis of the cost of the work in the Borough of Queens, dated October 14, 1910, is subjoined:

	Cost per acre to date	Estimated cost per acre of completed work
Topographical Survey including preparation of maps of street system and grades	Field \$8 13 Office 2 23 Total \$10 36*	Field \$8 06 Office 2 23 Total \$10 29*
Monumenting, including final traversing and preparation of final map sections	Field \$27 92 Office 10 89 Total \$38 81*	Field \$20 44 Office 7 89 Total \$28 33*

*The difference between the cost per acre to date and the estimated cost per acre of completed work is due to the initial cost of organization and to the cost of general work, such as triangulation and traversing, which must be done at the start for the whole or most of the area to be surveyed.

Baltimore In Baltimore the work of preparing an accurate and comprehensive topographical and property map was begun in 1893 by a Topographical Survey Commission created for the purpose. The area completely mapped was about thirty square miles although the triangulation necessarily extended over a considerably larger area. The first two-thirds of the area mapped was completed in about two years; the cost, including all field work, office work, draughting, and publication, was about \$5,000 per square mile. Allowing for the normally higher costs of all work in New York as compared with Baltimore, and allowing for the fact that the Baltimore figures include little if any street monumenting or final record maps of layout, this figure corresponds very closely with the cost of \$10.29 per acre or \$6,585.60 per square mile reported from the Borough of Queens.

PART IV

Notes on Parks and Recreation Facilities

PLANS for a grouping of public buildings in the Bellefield District, and for improving the entrance to Schenley Park, have been studied with some care. Two plans are herewith submitted (Plan A and Plan B), the essential difference between them being that Plan A contemplates scarcely more than the improvement of the existing layout, while Plan B involves a radical change of design, and absolutely requires, for its happy execution, a control of developments on the Frick property north of Forbes Street.

The Bellefield
Improvement

In Plan A the ravine between the Carnegie Institute and Forbes Field is not filled up but is enlarged. The bridge over the ravine remains, but the present driveway entrance from Forbes Street is moved 50 or 60 feet east, to give room for a double row of trees to screen the Forbes Field grandstand. This road is continued south from the end of the stone bridge to Bates and Boquet Streets, thus gaining a direct connection to the Oakland District. Another driving entrance is shown east of the ravine to accommodate travel from the East End through Bellefield, Dithridge and Forbes Streets. Bellefield Street is widened and Tennyson Avenue is extended from Fifth Avenue to Forbes Street, in order to give a more fitting approach to the Institute. And finally, an appropriate setting is provided for the front of the Institute by a small plaza surrounded by public or quasi-public buildings. It may be noted that one of these buildings, the stone church on Dithridge Street, already exists, but it is nearly hidden from Forbes Street by cheap wooden buildings and signboards.

It cannot be denied that the approach from Grant Boulevard to Schenley Park remains rather indirect, and even with the Bates Street extension there is a lack of obvious justification for the bridge location. It must be granted, however, that this bridge in itself is very attractive; and the whole scene, the little

valley with its informal groups of shrubbery and trees, spanned at one end by a stone bridge, is extremely interesting and pictorial and peculiarly characteristic of the Pittsburgh topography. The novelty of such a scene, in contrast to the stiff formality of



the city all about, gives it not a little value, and there is reasonable doubt if it should not be saved even at some sacrifice. An increased use of this valley would give further reason for its preservation; and the proposed taking of Junction Hollow for park purposes (discussed below) furnishes the opportunity. By carrying an informal park treatment from the valley below up the ravine and under the bridge to Forbes Street, and by having plenty of walks and benches and attractive planting therein, this ravine becomes an interesting and inviting branch of the park, and serves also as an informal entrance to the



University Buildings at Berlin, suggestive of the grouping proposed at the entrance to Schenley Park

lower park levels such as Junction and Panther Hollows. The use and the value of the ravine are thus materially increased.

In plan B the ravine is filled and the bridge abandoned. The present Grant Boulevard approach is changed to a more direct and dignified approach from Fifth Avenue and the Boulevard by widening Tennyson Avenue and cutting a broad street through from Fifth Avenue and Tennyson to Forbes Street on the axis of the new park entrance. This new entrance is a formal court enclosed by the Carnegie Institute on the east, by proposed public buildings on the north and west, and by a terrace overlooking the valley, on the south. By narrowing the area between the Institute and Forbes Field, a court of good proportions is obtained, and ample space is left on land already owned by the City for the enclosing building on the west. The strong axial approach in reality extends the park entrance to Fifth Avenue; and the court at Forbes Street, while adding to the dignity and character of this entrance, becomes a fitting plaza around which will be grouped the buildings of a public character. At the southern end of this court are the terrace, overlooking the park to the south, and the two driving entrances, one over Junction

Hollow bridge as at present and the other skirting down the west bank of Junction Hollow and joining the new Boundary Street (mentioned below), and thence entering the present park through Panther Hollow.



The parking of Junction Hollow is indicated in both plans, A and B. The Baltimore & Ohio Railroad proposed several years ago to relocate and lower its tracks in Junction Hollow and to abandon its present roadbed to the City as compensation for the streets and other city property to be occupied by the new railroad right-of-way. The present roadbed would become a cross-town thoroughfare* (Boundary Street) and the railroad would be in a cut just west of the street. This whole scheme has many advantages both to the railroad and to the City, and it is to be hoped that it may soon be realized. A careful investigation has shown that the Baltimore & Ohio owns such portions and only such portions of the valley as it may need to carry out this plan; and it is also reasonably certain that the Railroad does not contemplate using the wide portion of the valley—where the Italian settlement now is—for freight or storage yards. This whole valley is so closely associated topographically with Schenley Park, it plays so important a part in many of the views from the Park,—from the entrance, from the Junction Hollow bridge, from Panther Hollow and the Panther Hollow bridge,—that its control is of very real moment as a means of raising the value of the western portion of Schenley Park. Incidentally it can be made a very



Junction Hollow at Schenley Park entrance

attractive and valuable park unit in itself. On the whole, the entire valley from Forbes Street to Wilmot Street, and possibly beyond, should be controlled, and the taking should extend to the top of the west bank. In the narrow portion opposite Panther Hollow the Baltimore & Ohio Railroad owns to the top of the west bank, but undoubtedly it will be willing to release to

* Part II, Section 29, p. 69.

the City such portions of this bank as are not required by its relocation plans; or, if not, some agreement should be reached whereby this wooded bank will be saved from unnecessary defacement.

In conclusion, it should be noted that Plan A, although it shows some new buildings on private land, would be reasonably satisfactory without them. It is a plan which does not change the present design and one which can be carried out without the coöperation of private landowners in the development of adjacent properties. Plan B on the other hand involves a radical change in the park design, and furthermore it absolutely requires the coöperation of Mr. Frick in the development of his property between Forbes Street and Fifth Avenue, or the acquirement of that property by the City.

Although it is not ordinarily a good public policy to make radical changes in a park design already established, the improvements thereby obtained are sometimes so positive and important that the procedure is fully justified. It is believed that the radical changes proposed in Plan B are fully justified by the value of the improvement attained.

Grant Boulevard This street—a boulevard by courtesy—has undoubtedly more than justified the large cost of its construction by supplying a much-needed route for automobiles and other fast-moving travel—largely passenger vehicles—between the East End and the down town district. But it is to be regretted that a little more foresight was not evidenced in planning this work; that a better appreciation was not shown of the splendid opportunities offered and of incidental purposes to be served. Located as it is at a commanding height on a steep hillside with an impressive outlook over the Allegheny Valley and the hills beyond, and with little chance to develop a commercial frontage, this street seems peculiarly fitted to be a real pleasure way in fact as well as in name. But instead it has been built without even room for shade trees; it is a mere street, in all appearances like any other traffic way of the city, and no more generous in its width than Fifth Avenue or Smithfield Street; and the unkempt, sordid appearance of the slumping hillsides above is an ever-present eyesore.

In view of these facts it is urged that the following improve-

ments be made in Grant Boulevard: First, enough additional width should be obtained, where the value of frontage or the character of the land does not make it impracticable, to provide for a planting-strip with shade trees on either side of the roadway. Second, additional width should be secured at certain points along the street, where the opportunity seems most favorable, in order to provide special tree-shaded promenades or overlook terraces, where people may stroll amidst comfortable and agreeable surroundings, or sit upon benches and watch the passing stream of travel or look out upon the broad, distant views. Third, the steep hillsides above the Boulevard, at least those which do not have and are not likely to have in the future any appreciable commercial value, should be controlled by the City and reclaimed from their present status as free dumping-grounds and barren wastes. These hillsides are in fact so



Suggestion from Lausanne for treatment of a bluff

closely related to the Boulevard that their appearance is of almost equal import, in the value of the street as a pleasure thoroughfare, with the treatment of the street itself. Neatly kept banks, partially covered with trees and shrubs, would go far toward making this street a boulevard in fact as well as in name. Finally, where the slopes are too steep to stand securely at all times of year and in all kinds of weather, retaining walls should be built to prevent the slumping of clayey hillsides into the road, and the more dangerous falling of large pieces of stone from the disintegrating cliffs. Except for the western portion, the banks are seldom steep enough to require a wall of more than ten feet or so in height, even if the street is widened fifteen or twenty feet; but west of the line of Kirkpatrick Street the bank becomes steeper and is partially supported by strata of rather firm shale. It is where the bank is almost precipitous for a height of 30 to 60 feet that the

problem becomes difficult. A regular retaining wall of that height would be a tremendous undertaking and would look none too well in the bargain. It may be noted, however, that these cliffs are not solid ledges of shale, but are composed of separate layers, or strata, of pretty firm shale, between which are layers of loose disintegrated stone and earthy material. It is believed that advantage can be taken of this formation, and that all the necessary retaining can be done by several low walls, built one upon each stratum of ledge, and extending up to the bottom of the next solid stratum above. Each wall would thus retain only the few



Terraced gardens at Bern, effectively using the opportunity offered by steeply sloping land

feet of loose material between two solid strata, and it need not, therefore, be very thick or heavy; and in addition to the work of retaining, each little wall would act as a support for the shale stratum above. Such a device would require less than a quarter of the volume of masonry needed for one large retaining wall. Furthermore, if each little wall, instead of being built directly over the one below it, were set back a foot or two, or even more, as circumstances might require, and if small ledges and pockets were thus left, where little shrubs and vines and other clinging plants could be grown; and if great pains were taken to avoid the stiff monotony of regular cut masonry, it will be possible to make this utilitarian construction a feature of interest and beauty.

Steep Hillsides

The problem of making use of the excessively steep hillsides in the Pittsburgh District is a troublesome one.

There is a great deal of such land in the district, amounting, outside of the flat regions of East Liberty and the down town districts, to as much as 30 to 35 per cent of the total area.* Gener-



Hillside Suggestion from Nice—Easy gradients and beauty

ally speaking, the slopes are of little value for business purposes and are not well adapted to residential use, the cost of development being excessive in proportion to the location value of the improved property. The market prices are naturally low, especially for the steeper and rougher slopes and peaks and gulleys; and there the owners of very many of these unavailable properties have been delinquent in their taxes for so many years that the accumulation of taxes and costs of attempted collection form a lien that is much larger than the owner's equity in the property or even than its total value. As a rule these "unavailable areas" are unoccupied and unproductive, and are mainly held by owners not resident in the locality, whose sole interest in them is in the

hope—sometimes a forlorn hope—of an ultimate speculative profit. In far too many cases they are apt to be wholly uncared for and to become shabby, dirty, and altogether unsightly, depreciating adjacent property and contributing largely to the slatternly conditions in the midst of which so



Hillside road in a park at Nice

*See map between Preface and Introduction.



Steep hillside in Bern, made available for public use and enjoyment

many of Pittsburgh's working people, no matter how self-respecting and personally cleanly, are compelled to live.

The condition is a deplorable one from every point of view, and it is of great importance that steps should be taken to alter it. Where they are really worth developing for private occupation, so as to become useful and productive, such lands ought generally to be so improved; in the many other instances where



Hillside path at Nice, laid out to avoid steep gradients

to follow such a course would be for the owners to throw good money after bad, the City ought to step in and assume the burden of maintaining the land in a decent and attractive condition, converting it from a public nuisance into a park asset of positive value to the public.

To advance this end the City ought to pursue a definitely active policy in the matter. First, it should systematically insist upon the maintenance of all such vacant lands in a clean and orderly condition, and, upon the failure of any owner to perform the duty, it should declare the condition of the lot a nuisance, clean it up, and make the cost a lien upon the property. Second, it should entirely reform the procedure with respect to the collection of delinquent taxes and other public liens; instead of allowing them to run on indefinitely with accumulating costs, it should enforce a prompt settlement or demand the sale



An overlook terrace at Lyons

of the property for taxes. Third, it should deliberately acquire considerable areas of the lands in question, by tax sale, private purchase or condemnation, having due regard, in selecting the lands for acquisition, for their relative adaptability to public and to private use.

Generally speaking, these steeper and more irregular pieces will be of greater use to the public than they could be to private occupants. It must be noted, however, that their value for recreation is distinctly limited. They cannot adequately or economically supply the local needs for playfields, out-door gymnasiums and the like; and as isolated fragments they cannot, of course, fulfill the functions of large rural parks. It is possible, however, to lay out sidehill walks on easy gradients and to furnish seats and terraces, especially near the upper edge of such declivities, where the people of the neighborhood can stroll and rest

and enjoy interesting and extensive views over the city, the river or the adjacent valley; always with the steep natural hillside below as a foreground.



Precipitous hillside in Paris, planted and cared for by the City

Such areas, for instance, as the rugged slope under Bluff Street, or the precipitous land south of West Carson Street should be under public control. Hillsides less conspicuous, less striking in their characteristics, and offering inferior op-

portunities of outlook—while in themselves, perhaps, of doubtful value to the city—should be taken over rather than allowed to become positively injurious features in private hands. In other cases, unless their cost is practically nothing, and there is no apparent probability of future tax-paying development, the City could hardly afford to purchase and maintain them.



Hillside at Meissen, made useful and attractive by terracing, planting and care

GENERAL DISCUSSION OF PARKS

In any city closely built over a large area, public parks or recreation grounds become one of the most urgent civic needs, if the health and vigor of the people are to be maintained. And the most important classes to provide for are the children and the women of the wage-earning families; most important, not only because of their numbers and of the direct influence of their health and vigor upon the efficiency of the coming generation, but also because they, least of all, have energy and opportunity to seek out healthful recreation at a distance. Normally it requires two distinct kinds of recreation grounds to supply the needs of these people,—the local or neighborhood park for frequent and regular use, and the rural park for occasional holiday enjoyment.

Neighborhood Parks

The size and form and character most desirable for neighborhood recreation grounds depend upon the functions to be performed by each. Some of the activities in the best developed playgrounds, as for example in Chicago, are these: (1) The playing of little children in sand-piles and upon the lawn, under the watchful guidance of an attendant who not only keeps them out of danger and mischief, but plays with them, tells them stories and stimulates the healthy activity of their little minds and bodies. Here the mothers may come with their children and remain to watch them play or leave them in safety. A plot one hundred feet square may be of value for such uses. (2) For boys of larger growth and men and for girls and women, the more active games with and without apparatus, in the open air and under cover, always with opportunity and inducement to bathe, and, if possible, with a swimming-pool. Sometimes space is found for the big field games and regular athletic sports on a running track; sometimes for nothing that takes more space than basketball. (3) For the older and the less active people, pleasant shaded walks for strolling and benches to sit upon amid agreeable surroundings, with opportunity to see the youngsters play, and once or twice a week, perhaps, to enjoy a band concert. (4) For the use of all, a field house where the sanitary accommodations are kept to a standard of cleanliness and order that sets a good example to the neighborhood, where a reading-room branch of the public library is available, and in which one or more large rooms are at the disposal of the

neighborhood for lectures, entertainments and dances. Clean, healthy recreation may thus be given full play amid decent surroundings instead of being driven to saloons, to vicious or questionable dance-halls and other baneful establishments for the commercial exploitation of the spirit of play.

Of perhaps first importance in the planning of local parks is the problem of distribution—accessibility to the people served. Practically there are few women or small children who will take the trouble habitually to walk much more than a quarter of a mile to a playground or local park for exercise or rest, and for most a carfare is out of the question. This means that, ideally, there should be neighborhood recreation centers not more than a quarter or at most a half mile from every home in the city.

As for the total area desired for local parks, it is so seldom possible to get enough that there is little danger of overdoing the purchase; and the extremely limited experience of any of our cities renders any definite figures on the subject decidedly misleading. But there is a rather general consensus of opinion that about 5 per cent of the total city area is a reasonable minimum allowance to be devoted to local parks, playgrounds, and squares, and that more than 10 per cent may be uneconomic.

In Pittsburgh the questions of size and distribution of local parks must be considerably affected by the topographical conditions. The city and the contiguous boroughs are, to a certain extent, subdivided into hilltop and valley communities, close together it may be, but nevertheless isolated one from the other by almost precipitous hillsides from one hundred to four or five hundred feet in height. These communities are sometimes very small and are frequently very irregular in shape, as, for instance, when confined to the bottom of a narrow valley only two or three hundred feet in width and a mile or two in length. And even on those hillsides where a less severe topography does not actually stop development, it may still make intercommunication so difficult and laborious that the upper portion is practically separated from the lower.

Under such conditions it is certain that a comparatively small recreation center is the most suitable local park unit, especially in the rougher portions of the Pittsburgh District. In Chicago and other cities of normally flat topography, such advantages

have been found in grouping related activities—economy in maintenance and operation, and increase of efficiency per thousand of population served—that, *other things being equal*, reasonably large park units, probably twenty acres or more in extent, are considered more desirable than the same total area split into a larger number of small scattered squares. But the conditions in Pittsburgh are peculiar. Here each isolated community, no matter how small, needs its local park; every portion of the long, narrow valley settlement should be near a park; and hillside settlements at distinct levels should have separate opportunities for recreation. Considering the size and shape of the area to be served in many of these cases it is evident that the advantages of concentration must give way to the need for frequent centers, and that economy will here indicate the adoption of a normal size considerably less than that most desirable for cities of flatter topography.

In selecting the land for local parks in Pittsburgh there are three chief points to consider: cheapness, suitability of the land for the purpose, and accessibility to the people who will use it. The best method of procedure is as follows: first, decide upon the general locality within which the park is needed and the functions which it is to serve; second, make a general examination of the values of property within the locality, consider roughly the cost of developing different kinds of land into the sort of park required, and select, tentatively, one or more sites which seem promising; third, obtain options on such of the land within the limits of the tentative site or sites as can be put under favorable option; then, fourth, ask publicly for the tender of any lands in the locality for parks, and hold public hearings thereon; finally, in the light of the information thus secured, select definitely the site and boundaries of the park and take the lands by condemnation proceedings. It is far better to proceed in this way than to begin by buying or accepting certain pieces of land, no matter how favorable the terms may be, and subsequently acquiring adjacent pieces to rectify the boundaries or complete the requisite area. The very establishment of a park renders the adjacent land more valuable at once, and therefore, if the City buys park land piecemeal it has to pay in the latter purchases an increased price due solely to its having previously started to establish a park in

the neighborhood. The condemnation process, preceded by obtaining options where possible, takes all the land at one and the same instant, and the cost is that of land in a parkless district.

Delay is apt to add but little to the cost of acquiring parks in built-up regions where land and building values are reasonably stable, whereas it adds enormously to the cost in regions at the growing margin of the city. Here, where the greater city of the future is being made, is surely the opportunity to save the large cost of supplying a built-up district with neighborhood parks.

It should be the invariable rule, as it is in some of the states of Germany, that the amount of land which will be required to meet the public needs of the locality when fully developed should be set apart as a necessary incident to the subdivision of land. The method of setting apart such lands in a district which is subdivided and put on the market by a single owner would normally be dedication, as in the case of streets; but where the area to be subdivided is controlled by a number of different owners, the City might have to purchase or condemn the necessary public spaces and assess the cost upon the whole district benefited, as it frequently has to do with streets that run through the lands of several owners. A rigid and universal city regulation as to the reservation of open spaces would remove the competitive pressure which now forces many real estate owners and promoters to adopt, as a pure matter of business, an illiberal and short-sighted policy in the layout of land.

Some of the most successful suburban real estate operators in the northeastern states have satisfied themselves, and are now operating on the principle, that the dedication of land for local park purposes, up to a reasonable amount, if so arranged as not to interfere with the lotting system, actually increases the net returns from the operation. On a plat which was drawn by Wood, Harmon & Company to illustrate the application of this principle, about 30 per cent of the area was devoted to streets (about the normal figure for Pittsburgh) and about $7\frac{3}{4}$ per cent to the park.

Rural Parks The large rural park ought to provide something quite different from the neighborhood park. Except for those who live near it and for whom it may serve incidentally as a local park also, it is remote from the people, can be visited only occasionally and with some effort, and it will

be justified only if it affords something which the small local parks are totally unable to give. To afford the maximum of pleasant contrast with urban conditions is its fundamental purpose and, if it fail in this, there is reasonable doubt if its return in public usefulness is worth its cost to the community. A considerable degree of seclusion from adjacent land with its city developments is practically essential, and the more complete the barrier, both as to sight and sound, the more perfectly will the park fulfil its purpose. A sense of spaciousness is very important,—the expansive opposite of cramping city streets and walls. For this is needed the concentration of a large area in a single park. But of greater importance than mere size, especially in Pittsburgh, is the topographical situation. Hilltop lands though not in the least secluded frequently offer vantage points from which to look upon vast stretches of landscape, thus giving the greatest possible sense of spaciousness and lack of confinement. On the other hand, the valleys, with their wooded banks, are unrivaled in the natural opportunities they afford for almost complete seclusion from urban surroundings. Fortunately the Pittsburgh District is well endowed with available sites of both kinds, a few of which are noted below under "Special Park Opportunities."

SPECIAL PARK OPPORTUNITIES

The following are some notes, made in the course of the main thoroughfare investigations, regarding certain special opportunities for parks and parkways in and about Pittsburgh.

1. *Moultrie Street Playground*.—The small playground at Moultrie Street, in the Soho District, should be enlarged; for it is in the midst of a section where the need for public recreation facilities is very great. Moultrie Street, running north from Fifth Avenue, can be abandoned beyond the south side of the playground, because the proposed street on the hillside to the west* will furnish the needed connection between Fifth Avenue and Centre Avenue. The playground can then be extended from side to side of the valley bottom and north to the foot of the dump, thus getting an area of some 3½ acres. This dump, by the way, should not be extended any further down the valley.

*Part II, Section 12, page 62

2. *Millvale Playground*.—At Millvale, Butler Street bends into the mouth of the valley leaving a fair space of vacant land (some 5 or 6 acres) between the street and the railroad. Although this would not be an ideal location for a large neighborhood park, because the district benefited is entirely on one side, and the maximum number of people that could be accommodated would not be found within easy walking distance, a small park such as this, adjacent to the dense population of Millvale, would probably be within reach of all the people it could reasonably serve. Where flat vacant land is so scarce, this opportunity for a small park should not be neglected.

3. *Etna Playground*.—At Etna there is some vacant land in the hollow between Butler Street and Pine Creek in the vicinity of Isabella Street. Though the area is small, it should be reserved for public recreation, for it is in the midst of a dense population of working people, a place where playground space is most in demand.

4. *Etna Park*.—A short distance up the Pine Creek valley, just above the upper mills of the Spang-Chalfant Company, is a large meadow between the railroad and the main valley thoroughfare on the east, and the steep hillside on the west. Bearing in mind that this valley is the most important line of connection from Pittsburgh to the northern districts and is consequently sure to build up thickly, even as less important valleys have done, it seems wise to secure this land for public use while it is still vacant. Some fifteen acres are now available, and a complete, useful, and beautiful recreation ground could easily be made therewith. The flatness of the ground would make the development of such a park easy and comparatively cheap.

5. *Chartiers Valley*.—There is a good deal of vacant land along the Chartiers Valley, even in the vicinity of McKees Rocks. Considering the character and density of the population at McKees Rocks, and in the northern corner of Sheraden, it would seem eminently wise to secure a reasonable amount of this for local parks.

6. *Rankin Playground*.—In Rankin there is a hollow east of Kenmawr Avenue between the Pennsylvania Railroad and Brad-dock Avenue, which is available for a playground. Eight or ten acres could probably be obtained, and, by controlling the banks

of the hollow, a beautiful and secluded little park could be made. It is in the center of thickly populated sections of Rankin and Braddock.

7. *Sawmill Run Parkway*.—The Sawmill Run valley, from the West End to Fairhaven and possibly beyond, offers a park and parkway opportunity which should not be neglected until commercial development becomes a serious stumbling block to its realization. It is an interesting valley of varying width and form, enclosed by high, steep banks, occasionally wooded; in some parts it is wide enough only for a drive, while in others large, flat meadows make ideal places for play. And Sawmill Run itself, when it is no longer used as an open sewer, will be an additional element of park value. Surrounded as it is by land accessible to the city and reasonably adapted to residential use, this valley seems an unusual opportunity for effective park service. In taking it for park use, Shalerville and the Bell Tavern settlement would, of course, be excepted; otherwise, the holdings should be continuous from Temperanceville to Fairhaven; and such scattered buildings as would in any way impair the value of the park should eventually be removed. A boulevard thoroughfare should extend the length of the valley, serving not only as a cross-town connection between important radial thoroughfares, but as a link in a circumferential parkway system.*

8. *Nine Mile Run Park*.—Perhaps the most striking opportunity noted for a large park is the valley of Nine Mile Run. Its long meadows of varying width would make ideal playfields; the stream, when it is freed from sewage, will be an attractive and interesting element in the landscape; the wooded slopes on either side give ample opportunity for enjoyment of the forest, for shaded walks and cool resting places; and above all it is not far from a large working population in Hazelwood, Homestead, Rankin, Swissvale, Edgewood, Wilkinsburg, Brushton and Homewood; and yet it is so excluded by its high wooded banks that the close proximity of urban development can hardly be imagined. If taken for park purposes, the entire valley from the top of one bank to the top of the other should be included, for upon the preservation of these wooded banks depends much of the real value of the park.

* Part II, Section 71, page 81.

A pleasure drive should extend from one end of this valley to the other. The route of this drive has not been studied. At the northern end, however, there is no apparent obstacle to reaching any of the important thoroughfares, such as Penn Avenue or Forbes Street. At the other end there is a good chance to extend a parkway down the river as a riverside drive,* connecting at the Glenwood bridge with a proposed boulevard thoroughfare to the down town district.† This would furthermore be a desirable link in a circumferential parkway system which it is not unlikely will some day extend southward from the Glenwood bridge, and ultimately connect with the Sawmill Run parkway above proposed. (Section 7 above.)

9. *Squaw Run Park*.—Northeast of Aspinwall the valley of Squaw Run with its tributary, Stonycamp Run, would be ideal for park use. It has great beauty and variety of landscape. It has fields for playing as well as woods and a brook. It is secluded and by its wooded banks can always be kept so, even when the higher land about it is commercially developed. It is none too accessible at present, but it is in a clean and beautiful region, well adapted, topographically, for residential use, and such development will inevitably follow the improvement of transportation facilities to the business districts of Pittsburgh. The park will then supply the local needs of the surrounding communities, and, furthermore, it will be easily reached from many parts of the city. A parkway thoroughfare should extend up the valley.‡

10. *Guyasuta Park*.—Just west of Aspinwall is the valley of Guyasuta Run, a beautiful wooded ravine well suited to give holiday enjoyment to the people. It is already used extensively for this purpose, and it should be saved for the people for all time.

11. *Allegheny River Parkway*.—A riverside thoroughfare is described on page 79 (Part II, Section 61), running from the Sharpsburg bridge up the Allegheny River to Hoboken or Montrose. This should certainly be treated as a parkway, for opportunities to take advantage of the river in this way for public enjoyment are rare in Pittsburgh. Connections should be made into the Guyasuta Run and Squaw Run valleys.

12. *Beechwood Boulevard*.—From Highland Park to Frankstown Avenue, Beechwood Boulevard follows the bottom of a

*Part II, Section 32, p. 70. †Part II, Section 14, p. 62. ‡Part II, Section 63, p. 79.

valley. The plateau land above is thickly settled, and the valley banks are mere dumps of the most unsightly and objectionable character, which rob the Boulevard of much of its value as a pleasure drive. These banks are commercially of little use. In some portions of the valley there is sufficient depth of private property between the Boulevard and the foot of the bank to give usable frontage on the parkway, but the location, in the bottom of a valley, is so undesirable for house sites that a very cheap and unsightly development is apt to take place. This would be even more damaging to the pleasure drive than the present conditions. It is urged, therefore, that this whole valley from the top of one bank to the top of the other be taken as an essential part of the present parkway.

13. *Negley Run Parkway*.—It is further urged that the entire valley of Negley Run be added to the park system. This would be part of the plan for extending a thoroughfare parkway from Beechwood Boulevard up this valley and along Princeton Place to the heart of East Liberty.*

14. *Silver Lake Playground*.—Partly as an improvement to Beechwood Boulevard, but chiefly for its own sake, Silver Lake, to-



Lincoln Avenue bridge over Beechwood Boulevard, at Silver Lake, Pittsburgh

gether with the enclosing valley and its banks, should be taken for park purposes. It is an attractive spot in the midst of a closely built up section which has no local parks. Though small, it could well supply much of the need for recreation in the immediate neighborhood.

15. *Hights Run Valley*.—Another valley which should be added to Highland Park is that of Hights Run. Topographically it is so related to the park that any defacement of its present beauty by unsightly usage would greatly injure the value of the

* Part II, Section 23, page 66.

western portion of Highland Park. The whole valley, from its mouth to Wellesley Avenue and west to the top of the bank, should be controlled. A parkway thoroughfare from East Liberty down to the river should follow this valley.*

16. *Bluff Street Hillside*.—The precipitous bank, between Bluff Street at the top and Second Avenue and the Baltimore & Ohio tracks at the bottom, is a topographical feature of much interest and beauty in itself and having, further, a peculiar value as a typical and striking example of the natural physical characteristics of the Pittsburgh District. Commercially, it has little value, unless perhaps as a site for signs, and such use should above all others be guarded against. The whole bank should be owned or controlled by the City to prevent its defacement and to preserve a natural element of civic interest and beauty.

17. *Mt. Washington Hillside*.—Another feature of the same sort, only much larger, more conspicuous and therefore more important, is the precipitous hillside south of the Monongahela River from the West End to the Castle Shannon incline. Most of this slope is owned by the Railroad, and it may be that an agreement can be made with them whereby the City need not buy the land in order to stop effectually all defacement. But, whatever might be the best plan for control, there is no doubt that the area in question should be preserved intact for all time as a monumental example of the Pittsburgh landscape.

*Part II, Section 25, page 67.

PART V

Special Reports

THE MARKET

TWO conclusive reasons point to the removal of the Diamond Square Market from its present site. First, it is an obstruction at a vital point to the development of the thoroughfare system of the city; second, it is too small and congested for the proper performance of its functions.

The ingenious proposition has been made, in order to secure more space for the business, that the whole of the square be excavated and a basement or underground market be built extending under the surrounding streets. This would permit the extension and widening of Diamond Street and Market Street through the square at the ground level, although these improvements were not contemplated by those who suggested the basement market. Such an arrangement, if not coupled with the erection of structures above ground in such a manner as to interfere with the free passage of the two streets through the space, would seem to meet the traffic problem; except that the massing of vehicles and people on the surface, in connection with the marketing, would be somewhat objectionable.

But from the market point of view such a solution seems wholly unsatisfactory and inadequate. There is no question that the space is now too small for handling the business in a comfortable, sanitary and decent manner, and the space now occupied is by no means confined to the two old buildings. The sidewalk stalls, so called, from which nearly half the rentals of the market are derived, occupy a large part of the surrounding streets, and at the busy hour there is hardly a square foot of those streets that is not in use by the dealers or their customers. To build a basement market occupying the whole of the square, after deducting the considerable space required for entrances, stairways or inclines, elevators, piers, ventilating shafts, etc., would

not materially enlarge upon the present facilities; and it would put the market in a position where automatic means of relief, by overflow into the streets and into adjacent private stores, would be practically impossible. Moreover, the opinions of marketmen and of experts on the values of retail trade locations seem to be that the chances are desperately against the commercial success of any basement or underground market, no matter what skill may be exercised in meeting the problems of lighting, ventilation, and means of access.

In judging other possible solutions of this very perplexing problem it is important to consider the experiences of other large cities of the northeast states with the market business.

With only two exceptions all the markets of Boston, New York, Philadelphia, Baltimore and Washington have become less and less profitable during recent years. In some cases the business has fallen off so much that half the stalls are vacant, and in others the markets have had to be abandoned. The reasons offered by market superintendents and others for this general decline, upon analysis, may be summarized as follows: (1) With the increase in size of cities and the general change in habits, retail purchasers find it increasingly troublesome to go to a central market, and attach an importance to the convenience of purchasing from neighboring local provision dealers, and of having the goods delivered. (2) Owing also to general changes in habits of life, especially to the increasing specialization of knowledge and skill of all kinds, the average retail purchaser is becoming constantly less competent to form an independent judgment of the quality of provisions offered for sale, is more conscious of this incompetency, and is more and more dependent upon the reliability of the dealer; he is therefore less able to get any advantage from purchasing in an open competitive market. This again obviously makes for the advantage of the local provision stores. An index of this tendency is the increasing amount of ordering by telephone and otherwise "sight unseen."

Both the above factors, but especially the latter, are reflected in the fact that such of the public markets as are falling off least in their business are taking on more of the character of wholesale markets where the purchasers are experts representing either local retail provision dealers, or hotels, clubs and restaurants.

The two markets which have proved exceptions to the general rule are the Reading Terminal Market in Philadelphia and the Center Market in Washington. The Reading Terminal Market is owned by the Reading Railroad and is managed by a superintendent who has absolute control. It has been built up from nothing, fifteen or twenty years ago, to a flourishing business at present, and this has all happened in the face of the general decline in the market business throughout this section of the country. Mr. McKay, the superintendent, attributes his success to three main causes. In the first place, every consideration possible is given to the farmers; stalls are rented to them at about one-third the prices paid by city dealers and they are never ousted in favor of the latter. Furthermore, Mr. McKay spends considerable time canvassing the agricultural sections of the country within fifty miles of Philadelphia, hobnobbing with the farmers, getting them interested in selling their produce to the best advantage through facilities which he can offer them. In fact he does everything possible to encourage the farmers to make use of the market both for their own advantage and for his. In the second place, direct railroad connections furnish the best possible transportation facilities. Produce can be collected from the surrounding country at the least possible cost, and can be delivered to suburban residences much cheaper than by independent city stores. The third reason for success is able management. The market business, like any other, needs able management, and without that it is probable that any market undertaking, no matter how favored in other circumstances, will run a large risk of financial failure.

The success of the Center Market in Washington is apparently due mainly to the close relation maintained with the farmers and to its efficient general management.

It may be noted further that in Germany practically all the large public market houses have direct railroad connections.

In Pittsburgh the market business is apparently flourishing; and this in spite of the facts that no special encouragement is given to the farmers, that there are no direct or convenient transportation facilities, and that the management is not especially able. Considering the experiences of other cities, it is hard to account for this condition, but it is only reasonable to take warn-

ing and to expect a decline in the business sooner or later unless radical improvements are made.

It is to be considered furthermore that the city is not in the market business simply for the sake of getting a little revenue out of it. It is justified in conducting such an enterprise only on the ground that it provides a facility for the people which can not otherwise be well and economically provided. In the first instance public market places have always been established as a convenient means of purchasing provisions in an "open market," a place where prices are supposed to be determined by free competition among the producers with the minimum absorption of profit by the agencies roughly indicated by the term "middlemen." Under modern conditions, as the gap between the producer and the consumer has grown steadily bigger, the mere providing of a convenient vacant space in the city, where producer and consumer could meet and do their bargaining, has proved utterly insufficient. Apparently the recognition of the changing conditions has been so tardy on the part of those representing our cities in the administration of public markets, and their action so timid and temporizing, that they have left the bridging of the gap to commercial middlemen. In the course of the last two or three generations, therefore, the public provision markets have become largely places for a special group of middlemen, or retailers, to display their wares; in essence not very different from the natural groupings of other classes of retailers' stores in various quarters of the business district.

It is, therefore, of peculiar interest to note that the only two public markets in the cities investigated which have not shown a decline of business are those in which *special, constructive efforts* have been made, by the market administration, to maintain a close relation with the producer and to minimize the growing obstacles that tend to impede and complicate and make costly the operation of transferring goods from him to the consumer. Not only do these two exceptional markets with increasing trade point this moral very clearly; but at Boston, where the market is still very successful, though in diminishing degree and with an increasing emphasis on the wholesale end of the business, the superintendent is very clear in his view that it is upon the facilities offered to the farmers for direct sale from

their wagons that the continued success of the market largely depends.

It is one of the unfortunate features of the Diamond Square Market that it has been thought necessary to segregate the farmers' wagons in another locality, and a serious objection to the Square as a permanent market site is the impossibility of providing for them in connection with it. But while the farmers' wagons are important, even more important is the maintenance of facilities for the economical shipment, receipt, and sale of provisions from farmers who cannot bring their goods to market in their own wagons. Pittsburgh is not in the midst of an ideal farming country and an exceptionally large proportion of its food must come by rail. Even in Philadelphia, where the immediate surroundings of the city are much better adapted for the raising of provisions, the notable success of the Reading Market is largely due to the economical and convenient arrangements for getting produce to market by rail, and in Pittsburgh such facilities seem almost essential to any large and permanent success.

It seems clear then, that, if such a permanent success is to be made of the Pittsburgh Market, it must be moved from Diamond Square to a larger site with rail connections and room for farmers' wagons. Several localities have been studied with this idea in view and the best of them appears to be, as recommended earlier in this report, between Third and Fourth Streets and Penn and Liberty Avenues. The advantages of the site briefly are as follows: First, it is not far from Diamond Square, and is even more accessible from the cars passing over the Point Bridge by which a large proportion of the present patrons of the Market appear to arrive; and furthermore, the improvement of street railway transportation will undoubtedly mean the through-routing of cars, a change which will make this site directly accessible also from other sections of the city. Under the circumstances, to move the market so short a distance should not involve any serious loss of trade. Second, the land and the buildings are reasonably cheap although the frontage is on Liberty Avenue, one of the main arteries of travel in the Point District. Third, the area is large enough to allow a reasonable provision of space where farmers can remain and sell produce directly from their wagons and not be forced, as at present, to do business at a dis-

tance, on the Monongahela wharf; and furthermore there is plenty of room for expansion either across Penn Avenue or Fourth Street. Lastly, in this location, a direct connection already exists, via the Duquesne Elevated, with the Pennsylvania Railroad System, the most important freight carrier in the District; also the site is close to the Wabash Railroad, with which connection could be secured if further developments of the road should justify it; and being close to the Allegheny River all possible advantage can be taken of river transportation, especially for the receipt of produce.

It should be noted further that even with the best advantages of site and physical equipment a public market is by no means sure of success. More important probably than any other one element making for success is able and stable management. The market business is a large, intricate and many-sided business; and it is not reasonable to expect any very brilliant results under the management of a succession of superintendents rotating in office with political changes in the City Government, and not selected because of any special qualifications of experience or great business ability. A highly competent superintendent holding his office during good behavior will be essential to the success of the new market in Pittsburgh.

THE HUMP CUT

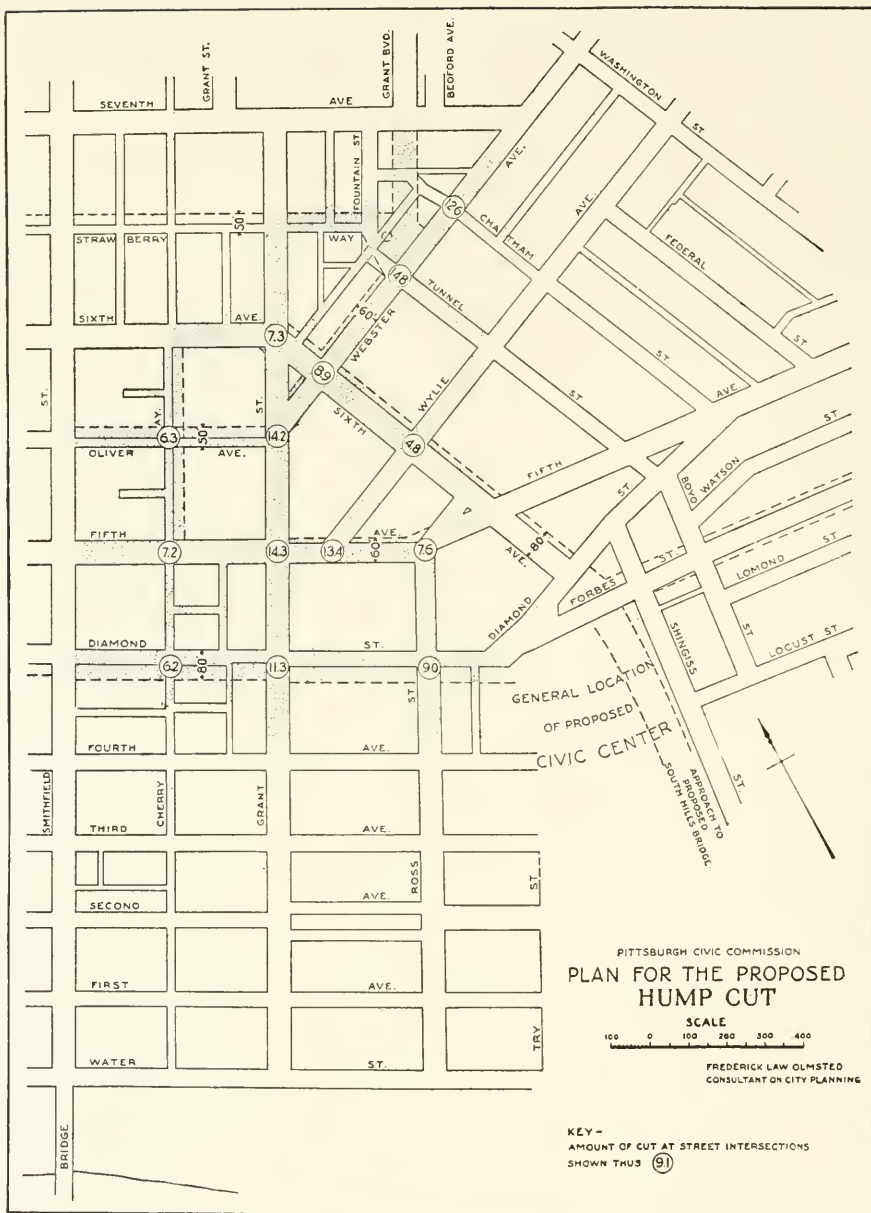
The purpose of this improvement, upon the successful attainment of which the plans must be judged, appears to be twofold: (1) To reduce the obstacle offered by the Hump to the general street traffic of the city, and (2) to reduce the obstacle which appears to be offered by the steep gradients to the expansion of the district available for high-class retail trade and offices.

The former is the larger consideration as regards the whole city. The latter is the main consideration as regards the locality itself and the interests of the owners of land therein.

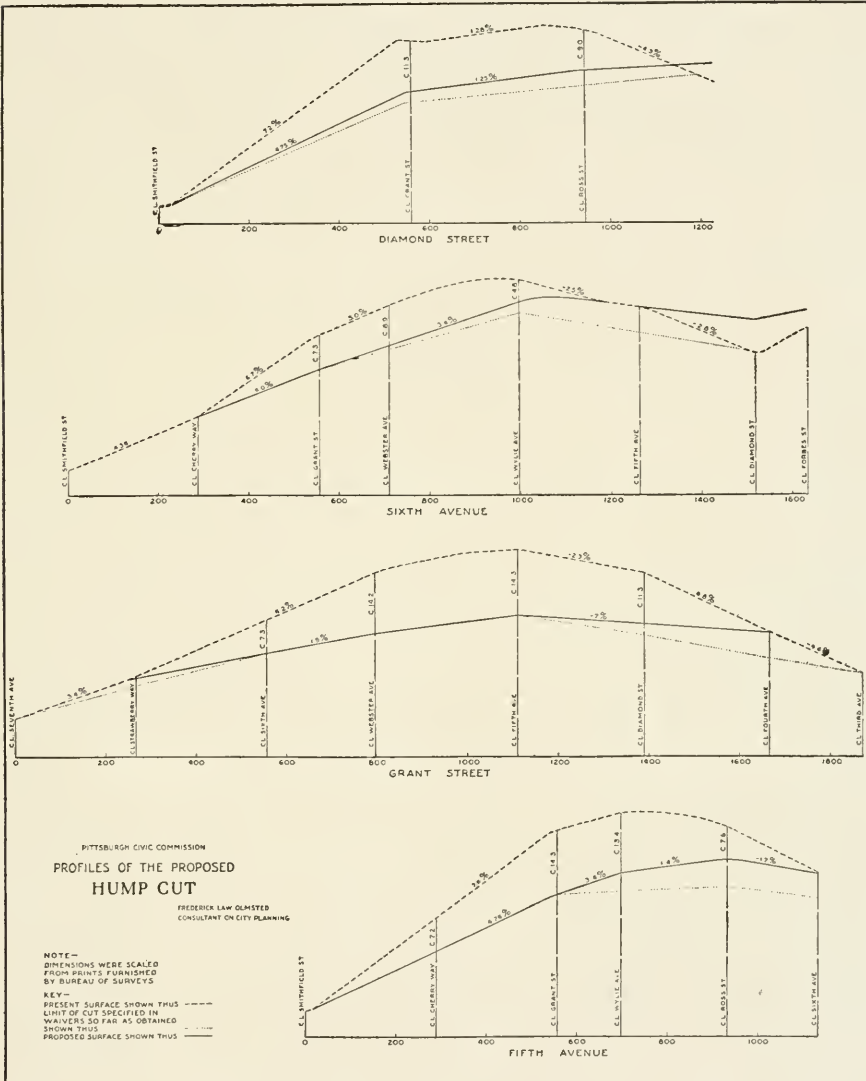
The plan of the Bureau of Surveys, marked "Approved December 23, 1909," shows proposed gradients on the east and west streets ranging from 4.75 per cent on Sixth Avenue to 5.88 per cent on Diamond Street, Fifth Avenue being 5.52 per cent. On Grant Street the maximum gradient is proposed to be

reduced from 4.8 per cent to 4.6 per cent. While these proposed gradients are undesirably heavy, it is believed that they would not in themselves offer a very serious obstacle to the advance of first-class business into the Hump District if for other reasons the growth should tend in that direction. Further, for automobiles, electric cars and light horse-drawn carriages the proposed gradients, while objectionable, are not, in view of the topography of Pittsburgh, very excessive. Such gradients, however, are prohibitive to economical teaming. They will be avoided by teamsters at the expense of a long detour if they can find a route of low gradient, and if there is no such route they mean the hauling of smaller loads, the making of more trips to do the same work, and a very appreciable tax upon the public, paid in the cost of coal, building material, household supplies, etc.

Almost at first sight there appear two important lines of travel which might naturally be expected to pass through the Hump District, and which would be seriously affected by gradients as heavy as those remaining under the Bureau of Surveys' plan. One is that leading from the Point District and from practically all the freight yards into the valley occupied by Fifth Avenue and Forbes Street. A second line which may be expected to have great importance is one connecting Second Avenue east of Try Street with Liberty and Penn Avenues in the vicinity of the Union Station—in other words, the most easterly line upon which a connection of easy gradient can be secured between the two valleys. The improvement of Forbes Street as the main artery of a large east-bound thoroughfare system, the location of the traffic artery to the South Hills region—the high-level bridge and tunnel—and the location of the proposed Municipal Building and Civic Center, which are all recommended in Parts I and II of this report, must inevitably add greatly to the importance of this region behind the Hump as a distributing point for traffic. Sixth Avenue, especially the diagonal portion, Fifth Avenue and Diamond Street are the thoroughfare lines to this point. Considered together with other improvements of the down town district, Diamond Street becomes perhaps the most important line over the Hump. From the point of view of the city as a whole, any plan for cutting the Hump which does not secure reasonable gradients on these thoroughfares must be regarded as ineffective.



The accompanying plan and profiles indicate the area and amount of cut which appears to be the least that should be undertaken. The area is practically the same as that proposed on the



Bureau of Surveys' plan of December, 1909; the cut at certain places, however, is considerably deeper. A cut of 11.3 feet at Grant and Diamond Streets gives a maximum gradient of 4.75

per cent on the latter; a cut of 14.3 feet at Grant Street and Fifth Avenue gives a maximum gradient of 4.74 per cent on Fifth Avenue; and a cut of 8.9 feet at Webster and Sixth Avenues gives a maximum gradient of 4.34 per cent on the latter and 3.4 per cent on the Grant Street-Sixth Avenue cross-town route. These gradients are certainly not ideal, but it is believed that they are good enough to justify the undertaking, and deeper cuts are not urged chiefly because the area of cut would thereby be extended further into abutting regions where little or no benefit could be assessed and practically no damage-waivers could be obtained; the cost of the undertaking being thereby inordinately increased.

On Grant and Ross Streets the maximum gradients proposed are about 4.5 per cent, not excessive for lines which are not of the first importance. There is little advantage in extending the cutting any further on Wylie Avenue than is forced by the cut on Sixth Avenue, for there is no object in securing an easy gradient at one point when the gradient just beyond is over 7 per cent and cannot well be improved. The same applies to Webster Avenue east of Tunnel Street, but it must be cut heavily at this point partly on account of the cut at Sixth Avenue and partly to provide a good gradient on the extension of Grant Boulevard.

The extension of Grant Boulevard and the widening of Webster Avenue from Tunnel Street to Grant Street, the widening of Strawberry Way and Oliver Avenue and the widening of Sixth Avenue and Diamond Street have been recommended in the first part of this report. It is further recommended: (1) that Fifth Avenue between Ross and Grant Streets be widened to 60 feet; (2) that Cherry Alley be widened to 50 feet between Fifth Avenue and Sixth Avenue, and (3) that the westerly corner of Sixth Avenue and Grant Street be cut off enough to allow the passage of one line of vehicles between the curb and a car rounding the corner. These changes should all be incorporated in any general plan for cutting and improving the Hump District.

THE CITY AND THE ALLEGHENY RIVER BRIDGES

*Recommendations for Bridge Heights and Pier Location.
to Meet the Various Transportation Needs of Pittsburgh*

BY COLONEL THOMAS W. SYMONS
AND FREDERICK LAW OLNSTED

INTRODUCTION

March 15th, 1910, upon recommendation of the Committee on City Planning, the Pittsburgh Civic Commission authorized Colonel Thomas W. Symons, Corps Engineers, U. S. A. retired, and Mr. Frederick Law Olmsted to make a report upon desirable heights and pier locations for bridges over the Allegheny River. The purpose of the Commission was to secure a report which weighed the interests of all parties to the bridge question, and which would strike a balance to meet the various transportation needs of Pittsburgh.

The Commission asked the Committee on City Planning to direct the preparation of the report. The Committee consists of T. E. Billquist, chairman; Charles F. Chubb, H. J. Heinz, Benno Janssen, Richard Kiehnel, E. K. Morse. This committee passed upon the report April 18th and recommended it to the Commission for adoption. On April 25th the Commission received and adopted the report and voted their hearty appreciation of the work of Colonel Symons, Mr. Olmsted and the Committee on City Planning. This report was published separately in May 1910.

RECOMMENDATIONS

1. That the Sixteenth Street and Forty-third Street bridges, which are obstructions to navigation on account of their pier locations, narrow channels, and exceptionally low clearance height, be required to be rebuilt with their piers so located as to give channels conforming to the neighboring bridges, and that their elevation be fixed with regard to eliminating the railroad grade crossings on their approaches, but the minimum clearance shall be fixed in accordance with the closing paragraph below.

2. That the Ninth Street bridge should be rebuilt as soon as practicable with a central pier and two wide spans conforming to those of the Sixth Street and Seventh Street bridges. The design of the new Ninth Street bridge, however, should not be finally determined and erection begun until a definite plan for comprehensive improvements in the traction system between the two sides of the river has been decided upon. Unless new circumstances develop before the construction of this bridge is begun that materially affect the problem of clearance height, the elevation should be fixed in accordance with the closing paragraph below.

3. That all questions pertaining to changing the elevation of the Sixth Street, Seventh Street, Fort Wayne, Thirtieth Street and Junction Railroad bridges be deferred to await the report of the Pittsburgh Flood Commission and the resultant action; to await the report on a comprehensive plan for traction improvements; to await the completion of the work projected by the City in cutting down some streets and filling others; and to await the results of the investigation of river boat design and construction provided for in the River and Harbor bill just passed by Congress.

4. That if it is deemed essential and necessary at present to decide upon the elevation to which all Allegheny River bridges must be made to conform, this elevation be fixed so that there shall be a clear head room of substantially 37 feet above pool level, varied so as to give at each bridge a clear head room of 28 feet when the river is at a 15 foot flood stage. This height to be maintained over the entire main span where there is a central span and for 180 feet on each side of the central pier where there is a central pier.

FULL REPORT

April 19th, 1910

THE PITTSBURGH CIVIC COMMISSION:

Gentlemen: In accordance with your expressed desire we have examined into the bridge problem on the Allegheny River now before the City, particularly in regard to the use of the bridges and their connections with the streets of the city and the use of the river for harbor and navigation purposes, and beg to submit the following report thereon:

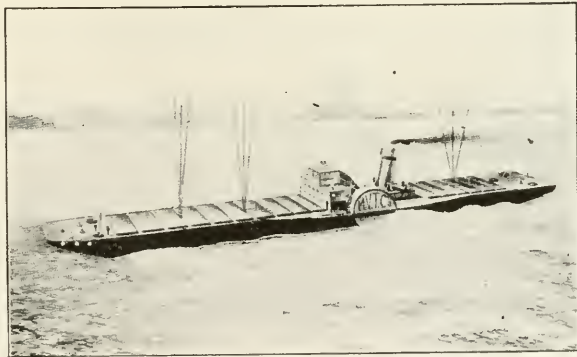
There are three great interests concerned in the problem of the bridges over the Allegheny River at Pittsburgh: (1) those who frequently cross the river or whose business requires the transportation of workmen, raw and manufactured material, and supplies from one side of the river to the other; (2) those concerned in the navigation of the river and harbor, and (3) those who own and operate the bridges.



German side-wheel boat, common on European rivers

In the hearings recently held on the subject much consideration has been given to the bridge owners and the navigation interests but comparatively little attention has been given, at first hand, to the interests of the general public, who in great numbers are interested in transportation across the river and for whose service both the bridges and river transportation exist.

It is quite apparent, from a study of the situation and the interests involved, that changes might be demanded in the bridges which would give some added advantage to river navigation, but yet would place so great a burden upon the interests concerned in crossing the river that the result would be a net loss to the general public. The following are the



Design of boat for American rivers, adapted from European models

two extreme positions somewhere between which all concerned would agree that a balance of interests most beneficial to the general public must be determined:

From the viewpoint of traffic across the river the best arrangement would be level bridges at the grade of the connecting streets, regardless of river traffic. The more bridges are



Wharf at Cologne, showing heights of boats

raised above that standard, apart from any question of first cost, the greater will be the interference with travel across the river, up to the point of prohibitive grades on the bridges and their approaches. Before this point is reached draw-

bridges must be considered which, while often required and adopted, are objectionable to the interests using the bridges and those passing under or through the bridges.

From the viewpoint of the river interests the most complete improvement would be to do away with the bridges entirely, thus giving absolute freedom of navigation. This is out of the question. The next best thing from that point of view would be to change the bridges to one span each across the river from bank to bank with height enough for passage beneath of the highest floating structures at all stages of the river. This would be impracticable without remodeling the city along both sides of the river for long distances from the banks at an expense so great as to be almost beyond computation. Anything less than this will impose, at least in theory, some hindrance upon river navigation, and this hindrance will be greater in amount as the head room is decreased and as piers are introduced into the river.

The aim in arriving at a solution of the bridge problem must be to adjust these conflicting interests impartially; and the factors to be considered in arriving at such an adjustment are these:

First, the amount and importance of the traffic likely to be affected in each case. *Second*, the extent to which any given solution would benefit or injure the bridge traffic and the river traffic, respectively.

1. *Amount and Importance of Traffic Affected.*—(a) *Bridge Traffic.*—There are in question six highway bridges and two railroad bridges.

Before referring to the statistics in regard to traffic over these bridges we wish to point out that much the greater part of it is of a kind daily and intimately affecting the business and the convenience of a large population. Any delay affecting the transportation of passengers over any of these bridges, and any delay or any increase of cost in teaming package freight and supplies from freight stations and warehouses and stores on one side of the river to their destination on the other side, would be felt very sharply by a considerable fraction of the manufacturers, merchants and other citizens of Pittsburgh. The inconvenience arising from any interference with traffic of this class would clearly be greater in proportion to the volume and value of the traffic than in the case of the slower moving river traffic. Ten minutes' delay to

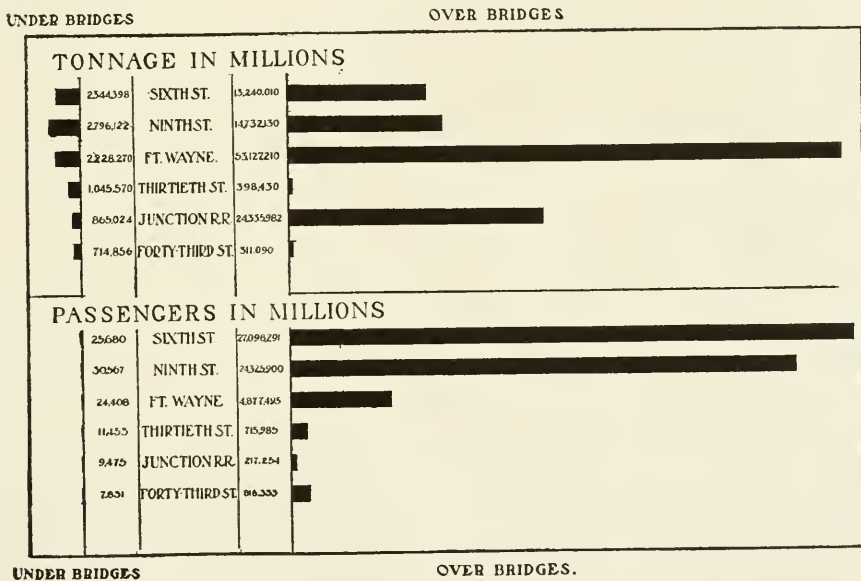
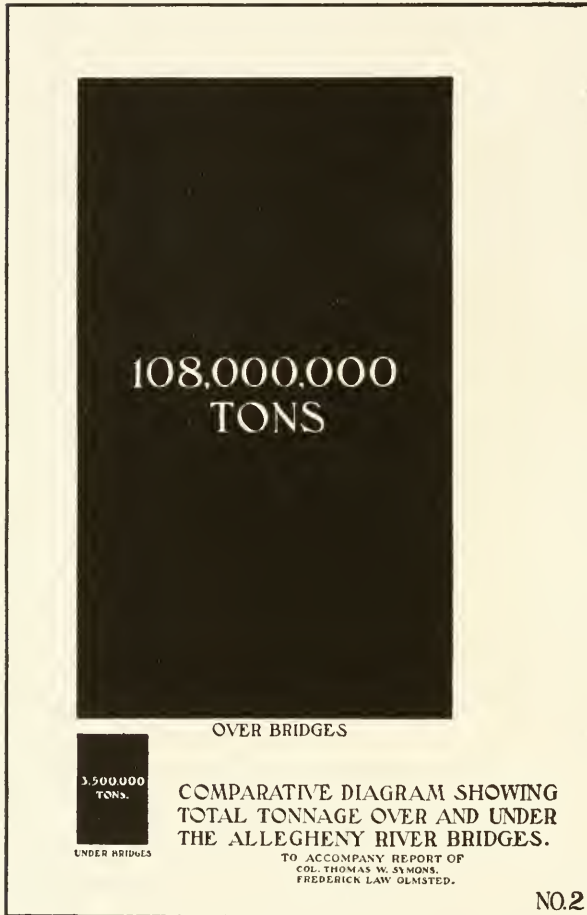


Diagram No. 1, showing comparative importance of traffic over and under Allegheny river bridges

people in reaching their offices or an hour's delay beyond the expected time in the delivering of household food supplies or express packages, etc., for a number of families, is a much more serious matter than a corresponding or even a greater delay in

the delivery of a barge-load of gravel or coal, even though the barge-load were of equal value with the delayed lot of supplies.

Details in regard to the volume of traffic over the bridges and estimates of the value of the goods transported and the equipment engaged in the traffic are given in Appendix I and are summarized in graphical form in Diagrams 1, 2 and 3. The amount and importance of bridge traffic may be summarized by stating that there



existing Allegheny River bridges each year about 108,000,000 tons of traffic roughly valued at \$9,350,000,000; and about 62,700,000 human beings, passengers and pedestrians.

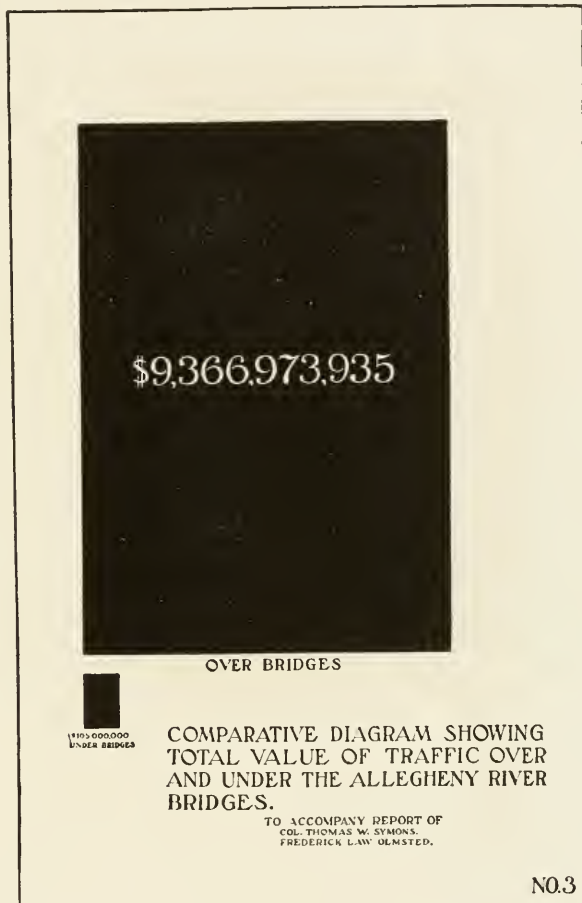
(b) *River Traffic.*—The data in regard to existing navigation under the Allegheny bridges consist of detailed reports of vessels and cargoes passing Dam No. 1 and counts of the number of vessels passing under the several bridges during representative

periods of from one to two months in 1909. From these data we have estimated the annual river traffic under each of the bridges, and very roughly, its value.* These amounts are shown graphically in comparison with the corresponding figures for traffic over the bridges in Diagrams 1, 2 and 3. To briefly summarize, it may be stated that the river traffic of the Allegheny River in one year amounts in the aggregate to about 3,500,000 tons, including all freight carriers and power boats, roughly valued at about \$105,000,000; and about 35,000 human beings, passengers by boat.

It seems well here to note that the water-borne traffic of the Allegheny River has been steadily decreasing for many years and is now but a small portion of that which once

existed. That this decline in river traffic is not due to the interference of the bridges is shown by the statement that the navigation facilities are better than ever before. It is due to the lack of modern terminal facilities, boats and methods of carrying on business.

There is a possibility that, in case improved conditions are provided for Allegheny River navigation, the amount thereof may



*Appendix II.

increase with the lapse of years, but for the reasons set forth in Appendix II, this increase is not likely to be so great in relation to the natural increase of the bridge traffic as to render the comparison of the existing facts in Diagrams 1, 2 and 3 inapplicable to the future.

(c) *Comparison of Bridge and River Traffic.*—To sum up, it may be said that each year the amount of traffic passing over the bridges is at least 30 times that floating on the water of the river, and about 90 times its value. The passenger traffic over the



Paris passenger and freight boats

bridges is about 1800 times that on the water. The character of the traffic over the bridges is such that a given degree of interference with it is a far more serious annoyance to the public than the same degree of interference with river traffic.

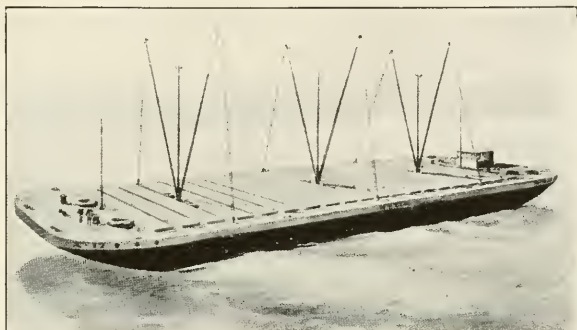
2. *Effect of Various Solutions.*—It remains to be considered to what degree the bridge traffic and the river traffic would be hampered or facilitated by various permanent solutions of the bridge problem. With a view to arriving at a plan as nearly ideal as the circumstances permit for a permanent arrangement of bridges over the Allegheny River, various projects have been put forward and considered. These concern two nearly independent matters, the elevation of the bridges above pool level and the location and design of the bridge piers. The former must be decided with regard to the effect upon both bridge and river

traffic; the latter may be determined with regard solely to the navigation interests, giving due consideration to the cost and the appearance of the resulting bridges, as discussed below.

The plan upon which interest is now most centered is that officially recommended by the local office of the United States Engineer Corps. We shall consider the effect of the bridge heights proposed in this plan as compared with certain modifications thereof; first, upon the bridge traffic, and second, upon the river traffic.

(a) *Effect of Various Possible Bridge Heights upon the Traffic over the Bridges.—Highway Bridges.*—The highway bridges carry two principal classes of travel. The first consists of vehicles moved by power, electric cars and automobiles, and of pedestrians.

With this class an increase of gradient on the bridges or their approaches, within reasonable limits, simply means the expenditure of a moderate amount of additional energy without material loss of time, or other difficulties. The second class consists of horse-drawn vehicles a large portion of which do not enter the hill districts but are limited in their movements to the large district lying on the lowlands of the three river valleys or accessible therefrom on moderate gradients. A great deal of this teaming consists of freight of all kinds received or shipped at the numerous freight stations on both sides of the river. The area accessible on roads of easy gradient from each end of these



Barge and towboat designed for shallow rivers and low bridges in the United States

bridges is very great and includes nearly all the important industrial plants in Pittsburgh as well as all the freight stations and the principal warehouses, retail stores and other commercial establishments of Pittsburgh and Allegheny. Any considerable increase of gradient on these bridges means a reduction in average size of load hauled by vehicles of this important class, and a corresponding increase in the number of trips and in the number of teams required to do the work, making for increased cost and greater congestion of traffic. For all horse-drawn vehicles an increase of gradient on the bridges, beyond a certain limit, means, especially in wet or snowy or frosty weather, more slipping and falling, more stalling of all bridge traffic by such accidents, more wear and tear on horse flesh, and a resultant increased burden on the people. To raise the gradient of the bridges from those now existing to those indicated in the plans of the local United States Engineers' office would more than double the traction effort required in hauling over these bridges.

It must be borne in mind that, as the gradients increase, the cost of teaming and the wear and tear on teams increases much more rapidly than the theoretical effective horse power, because of the increased difficulty of foothold. It is impossible to measure the effect of any given increase of grade with precision, but a comparison of the existing conditions with those resulting from various possible bridge heights will give a good general idea of the effect as shown by the following tables:

TABLE SHOWING BRIDGE GRADES INVOLVED BY THE ADOPTION OF
VARIOUS CLEARANCE HEIGHTS

Elevation in feet above pool level of under side of bridge over 360' channel.	Present	37'	42'	47'	Present	37'	42'	47'
	†Maximum gradients				Amount of rise in feet above Duquesne Way			
Sixth Street bridge	2.3%	3.2%	4.5%	5.8%*	7.5	10.4	15.4	20.4
Seventh Street bridge	3.0%	3.7%	5%	6.3%*	10.0	14.2	19.2	24.2
Ninth Street bridge	2.8%	3.5%	5%	6.5%*	10.1	13.3	18.3	23.3

* Gradients for this clearance height are greater than those shown on United States Engineers' plans because of greater width of channel. If United States Engineers' plans were adopted the maximum gradients would be as follows: Sixth Street, 4.35%; Seventh Street, 4.93%, and Ninth Street, 4.98%.

† The maximum gradients here given assume the improvement of the short pitches now existing on some of the bridge approaches.

TABLE SHOWING EFFECTIVE ENERGY REQUIRED TO OVERCOME RISE OVER
BRIDGES AT VARIOUS HEIGHTS

Elevation in feet above pool level of under side of bridge over 360' channel.		Present	37'	42'	47'
	Tons per annum	Foot tons of effective energy			
Sixth Street bridge .	13,240,010	99,300,075	137,696,104	203,896,154	270,096,204
Ninth Street bridge	14,732,130	151,740,939	195,937,329	269,597,979	343,258,629
		Per cent of increase of effective energy required			
Sixth Street bridge .			38.6%	105.3%	172.0%
Ninth Street bridge			29.1%	77.7%	126.2%

At the Sixth Street bridge there is at present an undesirably steep gradient* on the Allegheny, or North Side, approach, but it is only 230 feet long and being paved with stone gives a good foothold for horses. This is to be greatly benefited by filling up the street with material taken from the "Hump" grading, the plans on file in the City Bureau of Construction providing for an improved gradient of only 2.22 per cent. Many of the abutters have already waived their damages and there is no question that the improvement will be made. The present bridge gradients and those of the Pittsburgh approach are less than 3 per cent. At the Seventh Street bridge the gradients do not exceed 3 per cent, except on the Allegheny approach where it is now being reduced to 2 per cent. At Ninth Street, while the present bridge gradients do not exceed 2.8 per cent, there is a short pitch about 100 feet long in the approach on the Allegheny side with a grade of 5.24 per cent.† A small amount of regrading, involving no heavy property damages, will suffice to reduce these gradients to 1.3 per cent, and appropriations for this improvement have already been made by the City.

The existing grades at the Sixteenth Street, Thirtieth Street and Forty-third Street bridges are light, but it is not important to consider these bridges in detail in this connection as it is probable that the necessity for eliminating railroad grade cross-

* 3.64 per cent (United States Engineers' Office) or 4.0 per cent. (City Bureau of Construction.)

† Given as 6.35 per cent on United States Engineers' Sections.

ings will sooner or later alter the existing approaches in such a manner that the resulting gradients would not be further increased by raising the bridges. It is to be noted, however, that the precise elevations recommended by the local office of the United States Engineers for these bridges would involve serious complications with the railroad tracks.

In many cities having similarly situated level business and manufacturing districts along rivers, very large sums of money have been spent to reduce the gradients on the connecting bridges to less than 3 per cent, and that figure is rather generally regarded by engineers as a maximum upon important traffic bridges.

People in Pittsburgh are so accustomed to steep gradients in the adjacent hill districts that they are apt to ignore the fact that there is a city within their city, and that this inner manufacturing and business city is closely confined to the long drawn-out, irregular, level river-bottoms and is much freer from hills than New York, almost as much so as Chicago.

The city has expressed its willingness to spend a large sum of money and undergo great inconvenience for the sake of a moderate reduction in the street gradients of the "Hump" at one of the gateways of the hill districts. Important as this work is, it cannot be compared for a moment as a matter of traffic improvement with the importance attaching to easy gradients on the bridges, for the streets of the "Hump" district lead in the main from the flat part of the city to the hilly part where average loads are limited by the prevailing steep gradients, whereas the bridges lie between two parts of the level industrial and commercial city. If at low gradients they serve to unite them; if at high gradients they divide them.

Railroad Bridges.—In so far as any changes in the railroad bridges produce conditions less convenient and expeditious for handling the business which the people have to do with the railroad, the public has a direct concern in the matter.

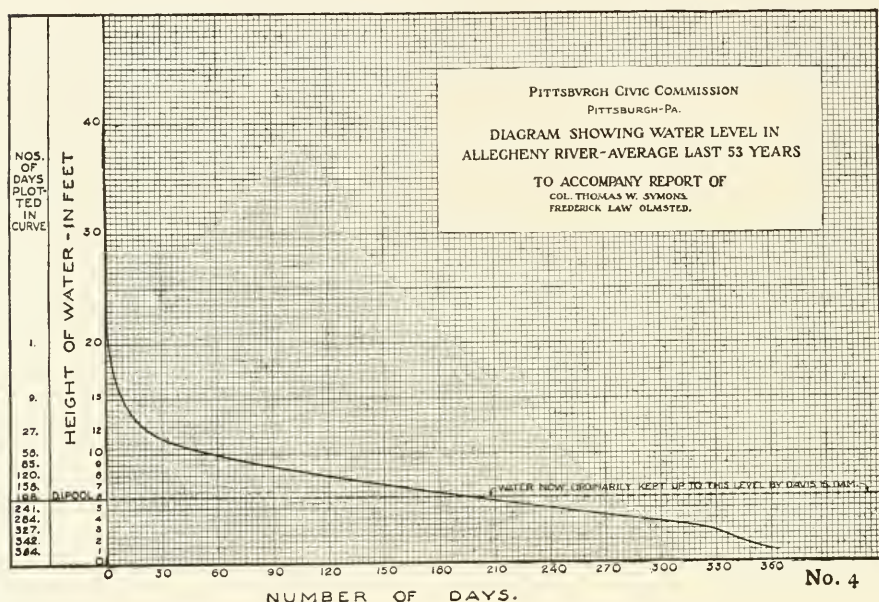
With regard to the Junction Railroad bridge of the Baltimore and Ohio Railroad System, the raising proposed by the local office of the United States Engineers, appears to involve no serious difficulties in operation which would affect the general public or the shippers.

With regard to the Pittsburgh, Fort Wayne and Chicago bridge of the Pennsylvania System, it is to be noted that this is a double-deck bridge, the upper tracks being used principally by passenger trains and the lower tracks by freight trains almost exclusively devoted to local freight business. The most serious consideration affecting this bridge is that any very considerable raising of the level of the lower tracks would throw them out of connection with the important local freight station to which those tracks run. Even if expense of reconstruction be wholly disregarded we believe no way can be devised by which the freight tracks of the Fort Wayne bridge, if raised as proposed by the local office of the United States Engineers can be connected with the freight station and industrial plants without involving greatly increased difficulty and delay in the handling of freight either on the tracks or in the station itself or in the teaming approaches to the station. When the large volume of local traffic handled at this station is considered, it is apparent that such a radical change is a serious matter for shippers and the great manufacturing and commercial industries of the city. Other than the expense of making changes in the bridge and its approaches no serious difficulty stands in the way of raising the clearance of the main span of the Fort Wayne bridge 2 or 3 feet to about 37 feet above pool level. To go above that figure involves the serious objections discussed above.

(b) *Effect of Different Bridge Heights Upon River Traffic.*—The effect upon river navigation of any standard that may be adopted for the heights of bridges depends upon the heights of the vessels using the river and the fluctuations of the river level itself. (See Diagrams 4 and 5.)

By means of Davis Island Dam in the Ohio River the water of Pittsburgh harbor is now kept practically at a minimum stage of six feet above the datum of zero at natural low water. This is the prevailing water level for the greater portion of the year. Floods come occasionally, produced by rains and melting snows, and, of course, with the floods come increased current velocities. These current velocities of each river depend upon the source of the flood. When the flood comes down the Allegheny River high velocities result. When the flood comes down the Monongahela the high water in the Allegheny is back-water without excessive

currents. Under this condition the Allegheny becomes a harbor of refuge for Monongahela commerce; and the reverse is true that in an Allegheny River flood the Monongahela becomes a harbor of refuge for Allegheny commerce. The floods in the two rivers seldom come at the same time on account of the differences in the topography and climatic conditions along the two



water-sheds. The most serious floods in the Allegheny generally come in the spring, when they are frequently accompanied with drift and ice to such an extent as to render navigation dangerous. At a stage of 15 feet in an Allegheny River flood the river current runs at rates of from 4 to 7 miles per hour. The record of fifty-five years shows that there is an average of 9 days each year when the river is above a 15-foot stage, and this is mostly in the winter and spring when navigation in the harbor is at its lowest ebb. There is presented herewith Diagram 4, showing graphically the average number of days each year during which the river has reached the various heights indicated.

There is also presented a hydrograph record of the river for four years past which indicates the conditions ordinarily met with as regards river stages at various times of year.

In the balancing of interests between the traffic on the river and that across the bridges, it is believed to be fair and just that for boats of excessive size and height the navigation of the river above a 15-foot stage be eliminated from the problem; (1) because of the comparatively small number of these boats; (2) because of the questionable necessity of having such high boats at all; (3) because of the period of the year when these extreme stages are reached; (4) because these periods of time are so limited in length; (5) because of the generally accompanying swift currents, and (6) because of the oft-times accompanying dangerous floating drift and floating ice.

As to the height of vessels, it is to be noted that the great bulk of navigation under the bridges is not through traffic, but is simply movements about in the lower stretch of the river which forms part of the harbor of Pittsburgh. The commodities moved are nearly all sand, gravel and coal in barges, which loads are almost invariably taken up stream while the downward movement is mostly of empty barges. These barges are mostly moved by harbor tugs. The harbor tugs actually in use are from 22 to 27 feet high, averaging about 24 feet.

The heights of the Monongahela standard towboats vary

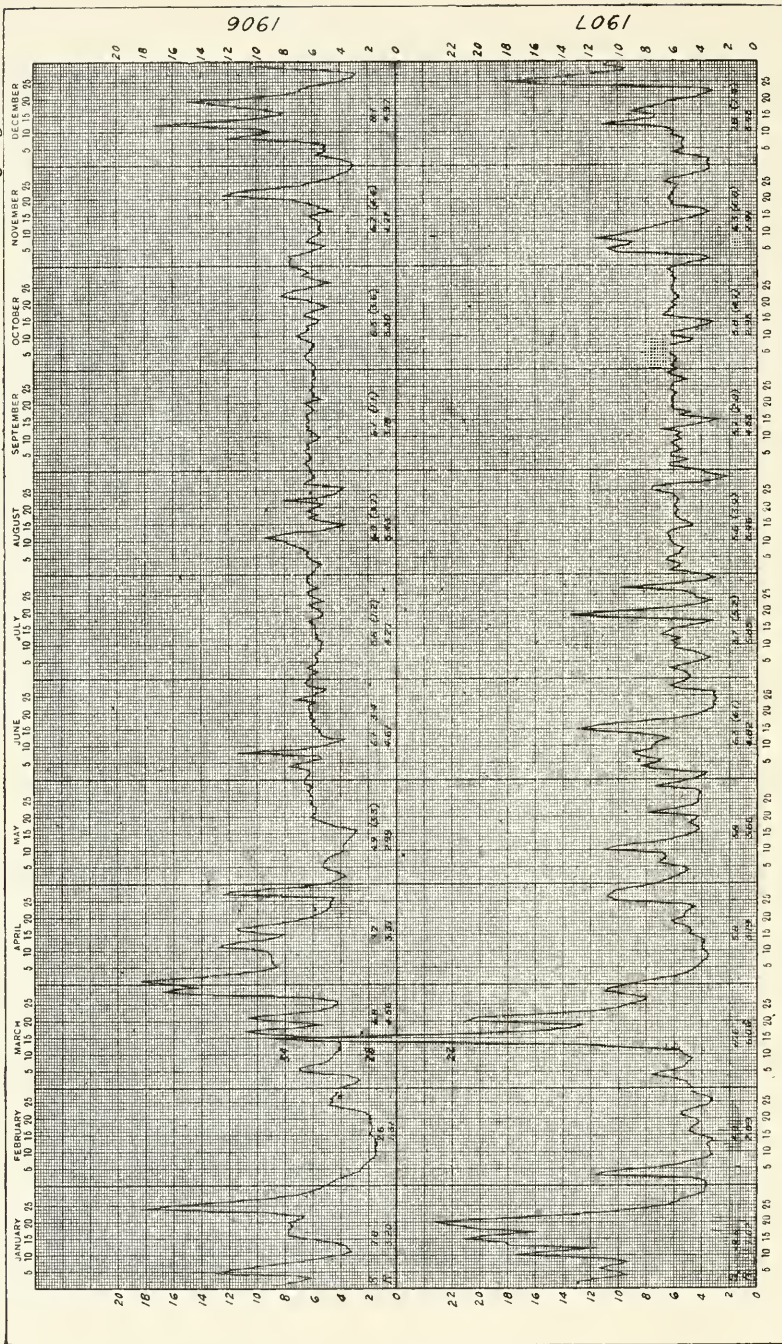


Towboat and barge passing under low bridge



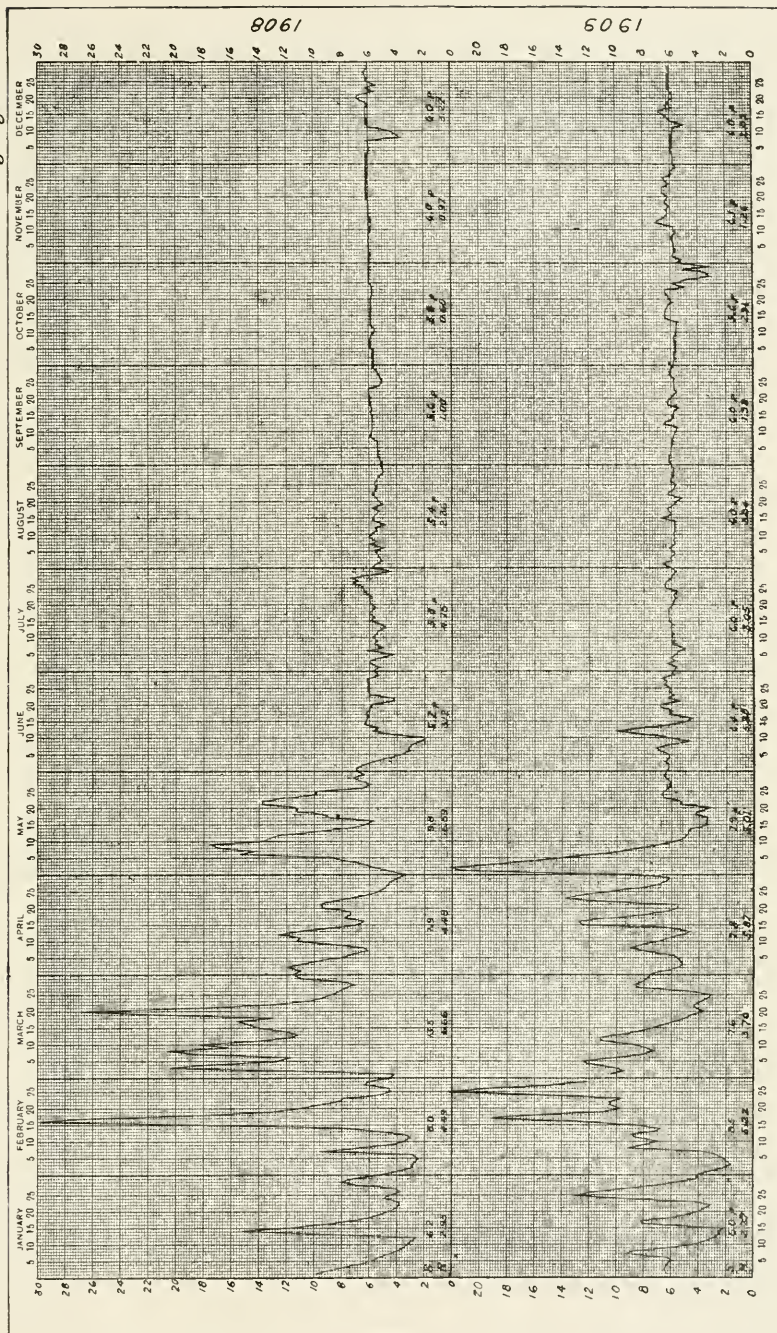
Closer view of such boats

Pittsburg Gage



Allegheny River heights for each day, 1906-1907.—U. S. Engineers' Report (Diagram 5)

Pittsburg Gage



Allegheny River heights for each day, 1908-1909.—U. S. Engineers' Report (Diagram 5)

from 24 to 32 feet, averaging about 28 feet. Out of a list of 28 such boats but 5 exceed 28 feet in height.

The few packet boats running on the river are of moderate height and can be accommodated in the harbor under the bridges at ordinary river stages. The amount of business that could be done by a few packet boats of extreme and unnecessary height is so small that to raise the bridges to a sufficient height to accommodate it would place an entirely unjustifiable tax and inconvenience upon the far greater business interest of the city concerned in crossing the river.

The following tables show the average number of days per annum during which various types of existing vessels would be prevented from navigation by bridges of various assumed heights above the Davis Island Pool:

TABLE SHOWING EFFECT OF VARIOUS CLEARANCE HEIGHTS UNDER BRIDGES

Assumed bridge height above pool level in feet	Present 6th St. bridge 33	37	42	47	Present 6th St. bridge 33	37	42	47
Types of Vessels	Total number of days per annum when clearance would be insufficient.				Total number of days per annum when clearance would be insufficient excluding days when river is above 15-foot stage.			
Harbor tugs, average height 24'	12	3	1	1	3	0	0	0
Harbor tugs, maximum height 27'	36	9	1	1	28	0	0	0
Monongahela boats, ordinary maximum height 28'	57	12	2	1	48	3	0	0
Monongahela boats, extreme maximum height 32'	198	57	9	1	189	48	0	0

In drawing conclusions from the above table, as a basis for plans governing the expenditure of millions of dollars in construction and the permanent establishment of conditions of navigation and of traffic over the bridges and the enormous business interests concerned, it is important to bear in mind that the types of vessels here considered are antiquated, and can undoubtedly be materially changed in many particulars to the benefit of all interests.

As bearing directly on this question of boats and bridges, attention is invited to the following extract from the report of

Hon. D. S. Alexander, chairman of the River and Harbor Committee of the United States House of Representatives, in submitting for action of the House the last River and Harbor bill on February 11th, 1910:

Modern Type of Boats for Non-tidal Rivers.—"The British Government has been designing shallow-draft boats for use on the Nile, and the German and Austrian governments have been working along similar lines with reference to methods of transportation on the Rhine, the Danube, the Elbe and other waterways. The boats designed have been very successful, having been used in connection with modern loading and unloading appliances. On our western rivers little change has been made in the design of towboats, barges, etc., since 1860, and it is believed that a design embodying the best points of modern vessels, with modern machinery and cargo handling devices, might lead to a marked increase in the traffic on the non-tidal rivers of the United States, especially after permanently improved channels are available.

"It is believed that the appropriation of \$500,000 to be expended in the purchase of plant for use in connection with the work of improvement of the river will also provide for experiments to be carried on by the Government which will result in improving the present type of river freight carriers; and also that these tests can be made in no other way, since the expenditures and uncertainties involved preclude the use of private capital for the purpose. As a result of the tests or experiments it is hoped that a large saving to the country at large may accrue from decreased costs of transportation, and that a type of carrier may be developed which will also reduce the cost of all bridges across navigable streams due to lessened requirements in the matter of head room."

This report of Colonel Alexander, the very able Chairman of the River and Harbor Committee of the House of Representatives, is worthy of serious consideration. Such an investigation and experiments to determine the best type of carriers to use on the river seems certain to be provided for and may result in clearly demonstrating that no necessity exists for raising the Allegheny bridges at all, in accordance with the possibility outlined by the closing paragraph of Colonel Alexander's report

above. The appropriation of \$500,000 as recommended by Colonel Alexander is included in the River and Harbor bill which has passed the House of Representatives and Senate. There is every probability that it will become a law.

A vast amount of water traffic is carried on inland waterways all over the world under fixed bridges with far less head room than is provided for under the Allegheny River bridges. It is customary in other parts of the country and the world to establish for rivers a minimum head room for bridges at a high navigable stage, which stage is considerably lower than the maximum or even the ordinary high flood stage. For instance, in the new barge canal being built by the State of New York at a cost of \$108,000,000 the minimum head room under all stationary bridges is fixed at $15\frac{1}{2}$ feet at the *high navigable* stage of the water. The *high navigable* stage is based chiefly upon what is a *safe* navigable stage, taking everything into consideration. It is by no means a very high stage. As this canal runs through the canalized Mohawk, Oneida, Oswego, Seneca and Clyde rivers, the situation is comparable with that on the Allegheny. The depth of the canal at low water is to be 12 feet, so it is seen that the clear head room is but about 25 per cent greater than the minimum depth of the water. *The boats must be made to fit the bridges, and not the bridges to fit the boats.* It is estimated that the amount of traffic which will pass through these canals about 450 miles long and under these $15\frac{1}{2}$ -foot bridges will be about 20,000,000 tons annually, many times the amount making use of the Allegheny River. The present Erie, Champlain and Oswego canals in the State of New York, which have been in operation for about 80 years, are crossed by several hundred bridges giving a clear head room of 13 feet. No complaint about this head room is known to exist, notwithstanding that steam vessels are largely used for navigation purposes on the canals. *The boats have to be made to fit the bridges and not the bridges to fit the boats.*

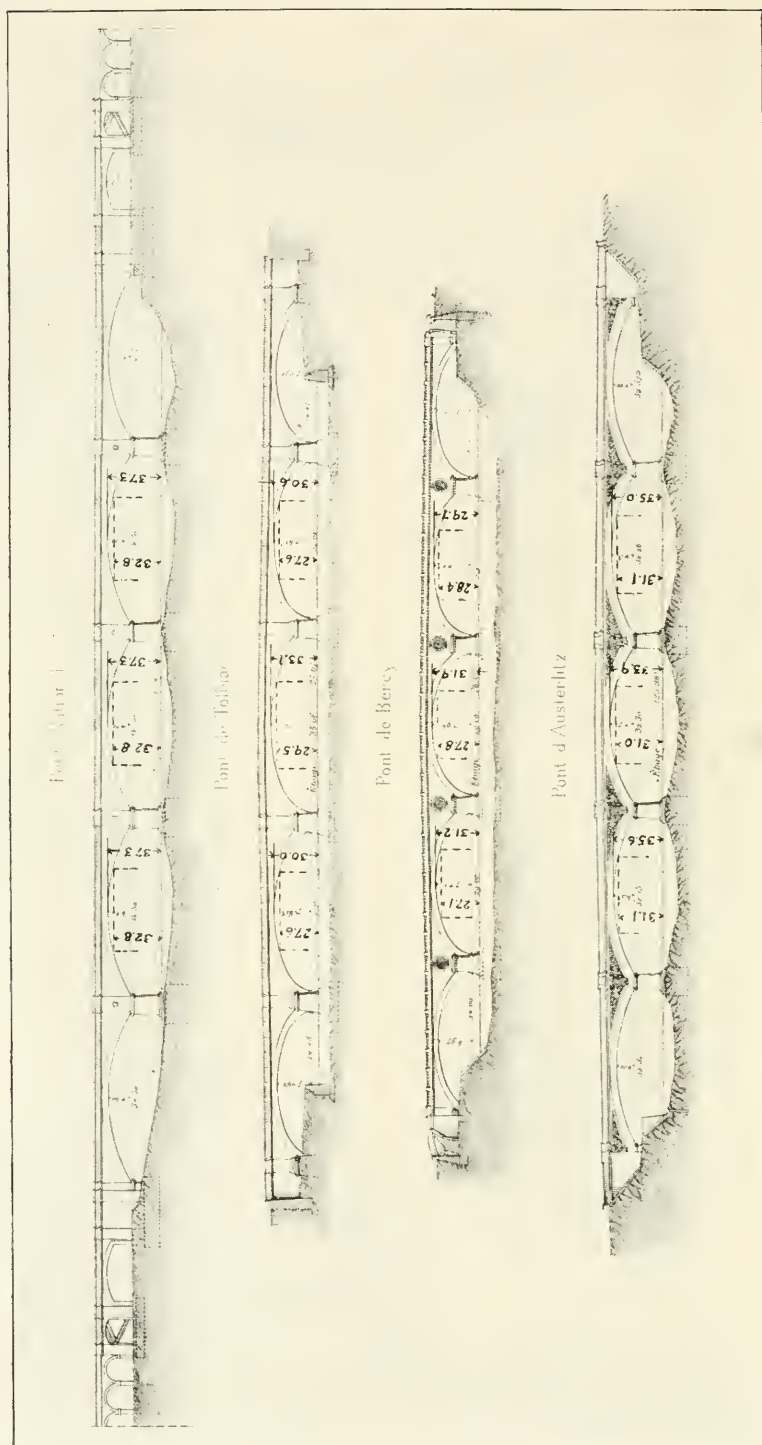
At Paris, the river Seine running through the city carries a very large amount of business. Annually about 20,000,000 passengers, and about 11,000,000 tons of freight are carried on boats of various kinds. There are 36 bridges which span the river and must be passed by the water-borne traffic. The clear head room under these bridges at the highest navigable water

varies from 11.25 feet to 21.88 feet. By highest navigable water is meant the stage of water when by reason of floods or currents, navigation ceases. This Paris water-borne freight traffic on the Seine amounts to fully 7 times that of the Allegheny River and passes under 5 times as many bridges, with minimum available head room at high navigable stages just about one half that under the present bridges over the Allegheny at a 15-foot stage. The conditions of navigation on the Seine at Paris are practically the same as those on the Allegheny at Pittsburgh. *In Paris the boats are made to fit the bridges and not the bridges to fit the boats.*

From these and many other illustrations that could be given it is evident that it is not universally or even commonly considered necessary or advisable to sacrifice business interests crossing the bridges to navigation interests using the waterways, to any such extent as that demanded by the navigation interests of the Allegheny River.

Conclusions as to Clearance Heights.—Disregarding for the moment the question of the time when changes in the present bridges should be required, it is believed, after very careful consideration, that the conditions brought out by our study of the problem would best be met by fixing the elevation for a substantial portion of each bridge in the center at a clear height above the pool level of substantially 37 feet, or 28 feet above the river at a 15-foot stage at each bridge. It is believed that this elevation will give fair, justifiable and all really needed accommodations to the navigation interests. This height can be attained without extravagant and unjustifiable expense and inconvenience to the business interests involved in crossing the river, and while it cannot be hoped that it would be satisfactory to the extreme advocates of river and harbor interests, it ought to satisfy those who are able and willing to give proper and fair consideration to other interests than their own. There are no reasonable navigation demands, with bridges at this elevation, that cannot be met if the water-borne commerce be conducted with vessels of the best modern accepted type and not of extreme or unnecessary height.

Piers and Channels.—For the benefit of the navigation interests there are certain changes in some of the bridges over the Allegheny that should be made without question. These relate to the location of piers and location and width of the navigable channels.



Bridges over the Seine, Paris, showing low clearance heights required and shallow water

At the extreme mouth of the Allegheny River a new bridge, the North Side Point bridge, has been approved by the War Department and is to be built. This is to have one central pier dividing the river into two channels.

A short distance above this North Side Point bridge is situated the Sixth Street bridge, in some respects the most important highway structure crossing the river. This bridge now corresponds to the North Side Point bridge in having a central pier and dividing the river into two main channels of ample width of over 400 feet.

The next bridge, the Seventh Street bridge, also has now a central pier with channels about 320 feet width on each side of it. The next bridge up the river, that at Ninth Street, has shorter spans, with the piers so unfortunately located as to be decidedly obstructive. As this bridge is of relatively light construction it is possible that the heavy and constantly increasing traffic which it is called upon to bear will before long necessitate its reconstruction anyway, and it will not be unreasonable to require it to be rebuilt with fewer piers properly located to conform to the plan adopted for the Sixth Street and Seventh Street bridges.

As a permanent arrangement of piers for the above three bridges either of two logical plans may be adopted. The first is to retain the existing two-spans center-pier arrangement of the Sixth Street and Seventh Street bridges, conforming to the center pier plan required by the United States Engineers for the new North Side Point bridge, and reconstruct the Ninth Street bridge upon the same general plan. The other is to reconstruct all three bridges with two piers and three spans each, as recommended by the local office of the United States Engineers. The first or central pier plan has the merit of economy of construction in that it involves the construction of no new piers for the Sixth Street and Seventh Street bridges, and permits the continued use of the existing superstructures of the Sixth Street and Seventh Street bridges by simply raising them to the elevation that may be decided upon and ordered. So far as we can ascertain, in view of the center pier plan adopted for the North Side Point bridge, the advantage to navigation appears to lie on the side of adhering to a center pier plan for these bridges also. On the other hand, there is no doubt that three-span bridges could be made more

agreeable in appearance than two-span bridges. But the possible gain in appearance alone does not appear sufficient to justify the adoption of three spans.

The next bridge above Ninth Street is that of the Pittsburgh, Fort Wayne and Chicago Railroad. This has been constructed with two main piers providing one main central channel 337.5 feet wide and three other piers giving four channels from 155 to 163 feet wide. Owing to the bend in the river at the bridge and the distance above the Ninth Street bridge, there is no valid objec-



Paris bridges and boats—low boats to fit bridges

tion to this single main central channel at the railroad bridge connecting either with two channels divided by the central piers of the bridges below, or with a central channel if those bridges should be reconstructed on the three-span plan.

The Sixteenth Street bridge has been constructed with 3 piers dividing the river into 4 channels of about 150 feet each; the clear head room beneath it is less than that now given by the bridges below it. The best arrangement to be made with this bridge is to require it to be rebuilt without the central pier, leaving a central channel about 320 feet in width between the two side piers to correspond with the railroad bridge just below it. It is an old, covered, wooden bridge, in poor physical condition, and, as previously noted, it is probable that it must be raised anyhow in connection with eliminating railroad grade crossings on the approaches.

The Thirtieth Street bridge has its piers properly spaced to leave a central channel 285 feet in clear width and no changes are required in pier and channel location at this bridge.

The Thirty-third Street or Pittsburgh Junction Railroad bridge of the Baltimore and Ohio System has 3 piers, giving a main central channel of 232 feet wide, with side channels 195 feet wide, and on the Herrs Island side of 150 feet. No change is needed in the location of the piers and channels at this bridge.

The Forty-third Street bridge is built with 3 piers, making 4 channels each of about 160 feet wide. It gives less clear head room at high river stages than most of the lower river bridges. It is an old wooden bridge, in poor physical condition. The best arrangement for this bridge is to treat it as the Sixteenth Street bridge, and to require it to be rebuilt, omitting the central pier and leaving a central channel about 300 feet wide, to correspond with the bridges below it. The elimination of railroad grade crossings on the approaches to this bridge is already a pressing public need and must soon result in its raising or reconstruction at a higher level.

Considerations against Requiring Changes in Bridges To Be Made at Present.—The following important questions, having a direct bearing upon the proper design of permanent bridges across the Allegheny River, are now under consideration:

1. The Flood Commission is getting data for studying the question of a protective embankment along the river front, and of the proper grades of streets and bridge approaches in the region subject to inundation. The design of such flood-protection works should have important bearing upon the grade, location and design of the permanent bridge abutments. This Commission is also studying the question of impounding the flood waters of the Allegheny and Monongahela Rivers in their upper valleys, which may result in materially lessening the height and velocity of floods in the harbor of Pittsburgh, and consequently, simplify the bridge and navigation problems of the harbor.

2. The question of the best routes for surface cars and rapid transit lines crossing the Allegheny River is now being studied for the City as a part of a comprehensive plan for traction improvements. The result of these studies might readily affect the design of the new bridges.

3. The government experiments recommended by Colonel Alexander of the River and Harbor Committee and authorized in the River and Harbor bill just passed by Congress and providing

for the development of a more economical and efficient type of river-boats, requiring less head room than the present antiquated types, may soon show results that would have a decided influence in determining the reasonable clearance heights of bridges.

4. Attention is also invited to the fact that the people of Pittsburgh have voted to expend about \$7,000,000 in certain public improvements. Among these are the cutting down of the "Hump," an obstructive hill in the city's midst, widening some



A typical Paris boat and tows

streets and filling certain other streets in the North Side and West End that are flooded at high river stages. The material from the "Hump" in the vicinity of the Court House is to be hauled to these North Side streets across the lower Allegheny bridges under question. The work is of great magnitude and it will take at least two years to complete it. Any material alteration to the bridges such as proposed by the Board of Engineers will require a long time to be carried into effect. While this bridge work would be under way, the transportation of the material excavated from the "Hump" and the filling up of the low grade streets of the North Side would have to cease or would be carried on with great difficulty and inconvenience to other traffic. This would tie up the whole work while it is in progress, causing material injury to the city, for it is to be extremely annoying and bothersome while it is in progress, and the longer this period is strung out the worse it will be.

For all of the above reasons we believe that to precipitate the actual reconstruction of the bridges at this time would be most undesirable for the city and prejudicial to the best results, in the long run, for all concerned.

RECOMMENDATIONS

In conclusion we beg to recommend as follows: 1. That the Sixteenth Street and Forty-third Street bridges, which are obstructions to navigation on account of their pier locations, narrow channels, and exceptionally low clearance height, be required to be rebuilt with their piers so located as to give channels conforming to the neighboring bridges, and that their elevation be fixed with regard to eliminating the railroad grade crossings on their approaches, but the minimum clearance shall be fixed in accordance with the closing paragraph below.

2. That the Ninth Street bridge should be rebuilt as soon as practicable with a center pier and two wide spans conforming to those of the Sixth Street and Seventh Street bridges. The design of the new Ninth Street bridge, however, should not be finally determined and erection begun until a definite plan for comprehensive improvements in the traction system between the two sides of the river has been decided upon. Unless new circumstances develop before the construction of this bridge is begun that materially affect the problem of clearance height, the elevation should be fixed in accordance with the closing paragraph below.

3. That all questions pertaining to changing the elevation of the Sixth Street, Seventh Street, Fort Wayne, Thirtieth Street and Junction Railroad bridges be deferred to await the report of the Pittsburgh Flood Commission and the resultant action; to await the report on a comprehensive plan for traction improvements; to await the completion of the work projected by the City in cutting down some streets and filling others; and to await the results of investigation of river-boat design and construction provided for in the River and Harbor bill just passed by Congress.

4. That, if it is deemed essential and necessary at present to decide upon the elevation to which all Allegheny River bridges must be made to conform, this elevation be fixed so that there shall be a clear head room of substantially 37 feet above pool level, varied so as to give at each bridge a clear head room

of 28 feet when the river is at a 15-foot flood stage. This height to be maintained over the entire main span where there is a central span and for 180 feet on each side of the central pier where there is a central pier.

We have the honor to be, very respectfully,

Your obedient servants,

THOMAS W. SYMONS,

Col. Corps Engineers U. S. A., retired,

FREDERICK LAW OLMSTED.

APPENDIX I

Amount and Importance of Bridge Traffic.—Highway Bridges.—

The following table gives the records of counts made in the fall of 1909, and spring of 1910 on the various bridges over the Allegheny River:

RECORD OF COUNTS.—TABLE NO. I

Location of bridges	Period of count	Street cars	Heavy wagons	Light wagons	Carriages	Auto-mobiles	Pedestrians
Sixth Street	Aug. 24-Oct. 23	89,354	55,791	79,247	9,534	24,583	1,605,793
Ninth Street	Aug. 26-Sept. 30	72,854	8,961	14,846	613	960	185,158
Sixteenth Street . . .	Oct. 4-Oct. 17	. . .	*4,444	*7,764	76,495
Thirtieth Street . . .	Aug. 24-Oct. 23	. . .	9,844	10,184	667	447	96,485
Forty-third Street . .	Aug. 23-Nov. 1	. . .	8,159	8,165	987	2,179	130,744

RECORD OF COUNTS.—TABLE NO. 1A†

Location of bridges	Period of count	Passenger vehicles	Delivery vehicles	Single trucks	Double trucks	Pedestrians
Seventh Street	Feb. 28-Mar. 3, 4, 5, 7	401	4,800	273	1,035	29,146

* Automobiles and carriages included in counts for light and heavy wagons.

† Table 1A. The count at Seventh Street bridge was recorded by different units and, therefore, required a separate table. The North Side approach to this bridge was being improved at the time the count was made, causing a temporary interference with travel reflected in an abnormally small proportion of traffic on the bridge and a corresponding increase for the adjacent bridges.

Assuming that the average number of vehicles per day and the average tonnage per day are the same throughout the year as during the periods of counting, we deduce the following results:

TRAFFIC FOR YEAR 1909.—TABLE NO. 2

Location of bridges	Period of count	Street cars	Heavy wagons	Light wagons	Carriages	Automobiles	Pedestrians	*Gross tonnage	†Total value
6th St. .	1909	534,652	333,829	474,171	57,013	147,095	9,608,406	13,240,010	*1,879,140,750
9th St. .	1909	738,650	90,812	150,490	6,205	9,709	1,877,268	14,732,130	2,201,473,500
16th St. .	1909	. . .	115,851	202,429	1,991,988	967,544	102,201,375
30th St. .	1909	. . .	58,875	60,919	3,979	2,664	577,320	398,430	44,233,500
43d St. .	1909	. . .	42,522	42,559	5,147	11,351	681,710	311,090	32,478,500

TRAFFIC FOR YEAR 1909.—TABLE NO. 2A†

Location of bridges	Passenger vehicles	Delivery vehicles	Single trucks	Double trucks	Pedestrians	*Gross tonnage	†Total value
Seventh Street . .	29,273	351,400	19,929	75,555	2,127,585	1,159,084	149,862,600

*In estimating the gross tonnage, the following average weights were used: a street car with average load—19 tons; a heavy wagon (including team), averaging loaded and empty vehicles—4 tons; a light wagon (including team), averaging loaded and empty vehicles—1.75 tons; an automobile or carriage (including team),—9 tons; pedestrians and passengers are figured at about 150 pounds apiece.

†Estimating heavy and light wagons, including team and load at \$125 per ton; carriages and automobiles, including teams, at \$300 per ton; cars at \$160 per ton and live stock at \$200 per ton, we get an average tonnage value of \$150 over the Sixth Street, Seventh Street† and Ninth Street bridges, and \$125 over the Sixteenth Street, Thirtieth Street and Forty-third Street bridges.

‡ See Note under Table 1A.

Railroad Bridges.—The bridge carrying the heaviest traffic is that of the Pittsburgh, Fort Wayne and Chicago Railroad, a part of the Pennsylvania System, which forms one of the links in the main line of this railroad system between the East and West. Across this bridge are carried each year about 2,750,000 passengers, 32,000 tons of mail, and 53,000,000 tons of freight and general railroad traffic, besides about 2,135,000 pedestrians,* making it one of the greatest throats of commerce in the country. This is a double deck bridge of 4 tracks, 2 tracks on each deck, with a wide footway on the lower deck. It is to be noted that the

*The figures for pedestrians, passengers and general tonnage are taken from the affidavit of John C. Perrott. The tonnage of mail was obtained from the report of the U. S. Post-office Department.

amount of traffic passing over this bridge is about 25 times as much as that which floats on the water beneath it, and is far higher in quality and value per ton.

The other railroad bridge crossing the river within the city limits is the Thirty-third Street viaduct of the Baltimore and Ohio Railroad. This is a link in the Baltimore and Ohio Railroad between the East and the West and carries an enormous traffic amounting each year to about 217,000 passengers and 24,330,000 tons of freight, express and other trains.

Uniting this with the traffic over the Fort Wayne bridge of the Pennsylvania we have crossing the Allegheny River on the two railroad bridges a gross amount of 77,330,000 tons, and 5,102,000 passengers and pedestrians, with a value of tonnage traffic estimated at approximately \$4,957,000,000.

APPENDIX II

Amount and Importance of River Traffic.—The following statistics were obtained from the United States Engineers' office and show the number of boats, net tonnage and number of passengers passing Dam No. 1 in the Allegheny River during the year 1909:

TABLE NO. 1

Month	No. vessels	No. passengers	Tonnage of cargoes
January	338	16	30,889
February	358	18	30,073
March	1,055	25	81,424
April	732	197	51,457
May	896	1,506	57,269
June	958	1,248	56,324
July	901	2,495	37,888
August	868	2,019	29,102
September	1,006	1,681	36,759
October	955	982	53,622
November	789	616	42,827
December	495	231	29,086
Total	9,351	11,034	536,720

The following are statistics of counts taken in 1909 at the different bridges:

TABLE NO. 2

Location of count	Period covered by count	No. of vessels passing
Sixth Street Bridge	Aug. 24—Oct. 23 (61 days)	4,534
Ninth Street Bridge	Aug. 26—Sept. 30 (36 days)	3,279
Fort Wayne Bridge	Aug. 20—Oct. 28 (70 days)	4,925
Thirtieth Street Bridge	Aug. 24—Oct. 23 (61 days)	2,022
J. R. R. Bridge	Sept. 13—Nov. 13 (60 days)	1,460
Forty-third Street Bridge	Aug. 23—Nov. 1 (70 days)	1,580

Assuming that the ratio between the number of vessels during any given period and the total for the year is the same at all bridges as at Dam No. 1; and assuming that the relative number of different kinds of vessels are the same at all bridges; and further assuming that the average weight of cargo is the same at all bridges as recorded at Dam No. 1, we reach the estimates of total traffic under the bridges given in Table No. 3.

FOR THE YEAR 1909—TABLE NO. 3

Location of count	No. of vessels	*Weight of vessels	Weight of cargoes	*Wt. of vessels and cargoes
Sixth Street Bridge	21,763	1,097,378	1,247,020	2,344,398
Ninth Street Bridge	25,904	1,311,823	1,484,299	2,796,122
Fort Wayne Bridge	20,685	1,043,020	1,185,250	2,228,270
Thirtieth Street Bridge	9,706	489,416	556,154	1,045,570
J. R. R. Bridge	8,030	404,905	460,119	865,024
Forty-third Street Bridge	6,636	334,613	380,243	714,856

*The following data as to weight of vessels was kindly furnished by Mr. J. F. Tilley:

WEIGHTS OF RIVER CRAFT WITHOUT FREIGHT

Medium tows	800 tons
Pool tows	175 tons
Barges	55 tons
Coal boats	105 tons
Flats	30 tons

In estimating we assumed the following average weights for river craft, based in large measure upon the above data:

Steamboats	225 tons
Coal boats and barges	80 tons
Barges	55 tons
House boats, excursion boats, yachts, and U. S. Government boats	45 tons
Launches, skiffs, etc.	1 ton
Motor boats and miscellaneous	10 tons

The largest total, that passing under the Ninth Street bridge, is without doubt somewhat less than the total traffic on the river,

and a careful study of the figures would seem to indicate that the total water-borne traffic of the Allegheny River in 1909 amounted to about one and three-quarter ($1\frac{3}{4}$) million tons of cargo or three and one-half ($3\frac{1}{2}$) million tons gross displacement, including cargoes, barges, tugs and all vessels.

The water-borne commerce on this river is of the cheapest character, consisting almost entirely of sand and gravel dredged from the rivers and coal floated down the Monongahela and delivered along the shores. All this sand, gravel and coal is carried in low-lying barges or scows moved by tugs or towboats.

A small amount of package freight comes in and leaves by packet boats.

TABLE NO. 4
TONNAGE PASSING DAM NO. 1 DURING YEAR 1909. (OBTAINED FROM
UNITED STATES ENGINEERS)

Coal	231,232 tons
Other iron or steel products	428 tons
Sand	132,894 tons
Gravel	123,579 tons
Brick	75 tons
Stone	3,869 tons
Timber	8,519 tons
Lumber	3,519 tons
Pit posts	13,950 tons
Braces	600 tons
Railroad ties	6,650 tons
Wood	45 tons
General merchandise	3,119 tons
New barges	2,623 tons
New boats (coal)	3,940 tons
Manure	1,000 tons
Bark	455 tons

The average value of the freight based on prices prevailing in 1910 is about \$3 a ton. The average value of the carriers is about \$65 a ton. As there is a slightly greater weight of freight than carrier, an average of \$30 per ton would be a fair estimate of the value of freight and carriers. The total value of the water-borne traffic of the Allegheny River for the year under the various bridges would, therefore, be about \$105,000,000.

The passenger traffic on the river is so small that it may be considered negligible. It is estimated at 35,000, largely pleasure traffic in small boats.

About one-third as much tonnage goes through Lock No. 2

as through Lock No. 1, and about one-sixteenth as much goes through Lock No. 3 as through Lock No. 1. There is no navigation on the river above the third pool. It is claimed, however, that with the further canalization of the river above Dam No. 3 and the raising of the bridges this traffic would be greatly increased. It is to be hoped that there will be a considerable increase, but there are distinct limitations on the probable amount of the increase. The Monongahela has a larger and more highly favored local territory to draw upon for freight than the Allegheny so that under the best of conditions, with every possible improvement of navigation, the traffic on the Allegheny can never be expected to approach that upon the Monongahela.

The total amount of freight of all kinds passing Dam No. 1 on the Monongahela in 1909, was 5,417,873, or a little more than ten times the amount on the Allegheny, while the tonnage passing over the Allegheny bridges is thirty times greater than the tonnage on the Allegheny River.* Yet, if conceivably the traffic on the Allegheny should equal that now on the Monongahela, it would still be only one-third that *over* the Allegheny bridges.

Since the figures for the present traffic over the Allegheny River bridges are used for comparison with the present river traffic, and since the former must continue to grow steadily with the growth of the Pittsburgh industrial district, it seems quite clear that no conceivable growth in the latter can seriously affect the overwhelming predominance of the bridge traffic in amount and value.*

* See Diagrams 1, 2 and 3.

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